PRELIMINARY DRAFT
2003 APPENDIX IV-A

DISTRICT'S
STATIONARY SOURCE CONTROL MEASURES

DECEMBER 2002

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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SECTION 1
STATIONARY SOURCE CONTROL MEASURES

INTRODUCTION

This Appendix describes the South Coast Air Quality Management District's (District's) proposed stationary source control measures to be included in the draft 2003 AQMP. Control measures presented in this appendix are based upon a variety of market incentives and control strategies that are commercially available and technologically feasible in the next several years. These control measures only address stationary sources that are under the District's jurisdiction. Additional stationary source control measures for source regulated under CARB are included in Appendix IV-B, State and Federal Source Control Measures. Contingency measures are also included in this appendix under Section 2.

STATIONARY SOURCE CONTROL MEASURES

The draft 2003 AQMP includes 18 control measures for stationary sources developed by the District that are expected to be implemented within the next several years. No long-term measures for stationary sources are being proposed for inclusion in the draft 2003 AQMP. Stationary source measures contained in the draft 2003 AQMP include the remaining revised and partially implemented measures from the 1997 AQMP and 1999 Amendment to the 1997 Ozone State Implementation Plan, with five additional new control measures.

It should be noted that the emission reduction targets for the proposed control measures (those with quantified reductions) are established based on available or anticipated control methods or technologies. However, emission reductions associated with implementation of these and other control measures or rules in excess of the AQMP's projected reductions can be credited toward the overall emission reduction targets for the proposed control measures in this appendix.

Surface Coating and Solvent and Solvent Use

The category of coatings and solvents is primarily targeted at reducing VOC emissions from VOC-containing products such as coatings and solvents. This category includes two control measures that are based on additional emission reductions from architectural coating categories and other miscellaneous coating and solvent operations.

Petroleum Operations and Fugitive VOC Emissions

This category pertains primarily to operations and materials associated with the petroleum, chemical, and other industries. Within this category, there is one control measure targeting fugitive VOC emissions associated with petroleum-related operations, and chemical products processing, and other manufacturing operations.

Combustion Sources

This category includes three measures targeting stationary combustion equipment. There are two control measures for the petroleum refinery industry which target VOC emissions

from refinery flares and PM10 and NH_3 emissions from petroleum fluid catalytic cracking (FCC) units. In addition, there is one new control measure that seeks to further reduce NO_x emissions from RECLAIM facilities.

Fugitive Dust Sources

This category includes two new control measures which would require further reductions in fugitive dust emissions from a variety of sources such as paved and unpaved roads, construction and demolition activities, aggregate processing and handling facilities, and cement manufacturing operations. Localized controls may be introduced in high PM10 areas to ensure attainment demonstration.

Miscellaneous Sources

There are a total of nine control measures in this category. The miscellaneous source category includes one control measure that targets PM10 emissions from under-fired charbroilers at restaurants. In addition, another measure proposes further control of VOC emissions from miscellaneous industrial process operations which may or may not already be subject to Regulation IV and XI rules. Two control measures are included in this category that address VOC and ammonia emissions from livestock waste and composting operations. A new control measure is included in this category that seeks to further reduce ammonia emissions from a variety of sources including mobile, area and stationary sources. In addition, a program is proposed to promote the use of lighter color roofing, road materials, or tree planting. Another measure is proposed to reduce ozone emissions in the ambient air through the use of catalyst-surface coating technology. This measure has a potential to be implemented geographically to reduce ambient ozone concentrations. This category also includes a measure that would implement an emission charge of $5,000 per ton of VOC for all large VOC sources emitting over 10 tons per year in the event that federal ambient air quality standard for ozone is not met by 2010. An additional new control measure would establish a mitigation fee program for federally-controlled sources such as aircraft and ships.

Compliance Flexibility Programs

This category includes one control measure that enhances regulatory compliance by providing additional flexibility and compliance options thereby lowering compliance costs and incentivizing early reductions and advancement of clean technologies.

RULE EFFECTIVENESS

The 1990 federal Clean Air Act requires that emissions inventories be adjusted to reflect the rule effectiveness. As defined by EPA, rule effectiveness reflects how emission reductions due to implementation of a regulatory program are estimated. EPA suggests a default value of 80 percent if emission reductions are estimated based on projected

control efficiencies and emission factors. If a higher rule effectiveness value is used the District needs to demonstrate how these emission reductions will be achieved.

As described below under Rule Compliance and Test Methods, the compliance demonstration for each proposed control measure, where the District accounted for emission reductions, identifies the compliance mechanisms such as recordkeeping, inspection and maintenance activities, etc., and test methods such as District, ARB, and EPA approved test methods. The District's on going source testing and on-site inspection programs also strengthen the status of compliance verification. In addition, the District conducts workshops, compliance education programs to inform facility operators on rule requirements and assist them in performing recordkeeping and self inspections. These compliance tools are designed to ensure rule compliance would be achieved on a continued basis. As a result, the control measures proposed in this appendix with quantifiable emission reductions are based on a rule effectiveness of 100 percent.

FORMAT OF CONTROL MEASURES

Included in each control measure description is a title, summary table, description of source category (including background and regulatory history), proposed method of control, estimated emission reductions, rule compliance, test methods, cost effectiveness, and references. The type of information that can be found under each of these subheadings is described below.

Control Measure Number

Each control measure is identified by a control measure number such as "CM #2003CTS-01" located at the upper right hand corner of every page. "CM #" is the abbreviation for the "control measure number" and is immediately followed by the year of the AQMP revision.

The next three-letter designation, "CTS" represents the abbreviation for a source category or specific programs. For example "CTS" is an abbreviation for "Coatings and Solvents." The following provides a description of the abbreviations for each of the measure.

- CTS Coatings and Solvents
- CMB Combustion Sources
- FUG Fugitive Emissions
- MSC Miscellaneous Sources
- BCM Best Available Control Measures for Fugitive Dust Sources

- PRC Process Related Emissions
- WST Waste Related Measures
- FLX Compliance Flexibility Programs
- FSS Future Study Strategy

If the measure is based on a control measure from the 1997 AQMP or the 1999 Amendment to the 1997 AQMP, the former control measure number is the same, except the year designator will be 2003, indicating the 2003 AQMP revision, e.g. CM #2003FLX-01 is based on CM #97FLX-01.

Title

The title contains the control measure name and the major pollutant(s) controlled by the measure. Titles that state "Control of Emissions from..." indicate that the measure is regulating a new source category, not presently regulated by an existing source- specific District rule. Titles that state "Further Emission Reductions of" imply that the measure would result in an amendment to an existing District rule.

Summary Table

Each measure contains a table that summarizes the measure that is designed to identify the key components of the control measure. The table contains a brief explanation of the source category, control method, emission reductions, control costs, and implementing agency.

Description of Source Category

This section provides an overall description of the source category and the intent of the control measure. The source category is presented in two sections, background and regulatory history. The background has basic information about the control measure such as the number of sources in the Basin, description of emission sources, and pollutants.

The regulatory history contains information regarding existing regulatory control of the source category such as applicable District rules or regulations and if the source category was identified in the 1999 or prior AQMPs.

Proposed Method of Control

The purpose of this section is to identify potential control options an emission source can use to achieve emission reductions. If an expected performance for a control option is provided, it is intended for informational purposes only and should not be interpreted as the targeted overall control efficiency for the proposed control measure. The overall control efficiency for a control measure should take into account achievable controls in

the field by various subcategories within the control measure. This type of analysis is typically conducted during rulemaking, not in the planning stage. It has been the District's long standing policy not to exclude any control technology and have intentionally identified as many control options as possible to spur further technology development. Therefore, potential control options described in this section do not ensure their viability when subject to further technology assessment conducted during the rulemaking process.

In addition to the proposed control methods discussed in each control measure, affected sources may have the option of partially satisfying the emission reduction requirements of each control measure with compliance flexibility programs currently available, or those that will become available in the future from the on-going implementation of control measure CM #2003FLX-01. Examples of compliance flexibility programs currently available include Rule 2020 – RECLAIM Reserve and the pilot credit generation rules under Regulation XVI – Mobile Source Offset Programs. Future enhancements to Regulation XVI may include additional opportunities to generate and use credits from mobile sources which could advance the utilization of these credit rules and other compliance flexibility programs similar to regulation XVI.

Emissions Reduction

The emission reductions are estimates based on the baseline inventories prepared for the draft 2003 AQMP and are provided in the Control Measure Summary Table. The emissions data are based on the annual average inventory for all five criteria pollutants. The planning inventory adjusts the emissions by taking into consideration a source category's seasonal variations. The emissions affecting ozone concentration (i.e. VOC and NO_x) are presented under the Summer Planning Inventory. The emissions section of the summary table includes the 1997, 2006, and 2010 inventory. The 2006 and 2010 emission projections reflect implementation of District adopted rules. Based on the expected reductions associated with implementing the control measure, emission data are calculated for 2006 and 2010 assuming the implementation of the control measure in the absence of other competing control measures.

The emission reductions listed in the summary table represent the current best estimates, which are subject to change during rule development. As demonstrated in previous rulemaking, the District is always seeking maximum emission reductions when proven technically feasible and cost-effective. Several control measures were estimated to have a range of emission reduction potential. The lower end of the reduction was used in the draft 2003 AQMP, pending further feasibility analysis. For emission accounting purposes, a weighted average control efficiency is calculated based on the targeted controls. The concept of weighted average acknowledges the fact that a control measure or rule consists of several subcategories, the emission reduction potential for each subcategory is a function of proposed emission limitation and the associated emission inventory. Therefore, the use of control efficiency to estimate emission reductions does not represent a commitment by the District to require emission reductions uniformly across

source categories. In addition, due to the current structure of emission inventory reporting system, a control measure may partially affect an inventory source category (e.g., certain size of equipment or certain level material usage). In this case, an impact factor is incorporated into the calculation of a control efficiency to account for the fraction of inventory affected. During the rule development, the most current inventory will be used. However, for tracking rate-of-progress on the SIP emission reduction commitment, the approved AQMP inventory will be used. More specifically, emission reductions due to mandatory or voluntary, but enforceable, actions will be credited under SIP obligations.

Rule Compliance

This section was designed to satisfy requirements in the 1990 Clean Air Act in which EPA has indicated that it is necessary to have a discussion of rule compliance with each control measure. This section discusses the recordkeeping and monitoring requirements envisioned for the control measure. As discussed under this section of the control measure, the District would continue to verify rule compliance through site inspections and submittal of compliance plans.

Test Methods

In addition to requiring recordkeeping and monitoring requirements, EPA has stated that "An enforceable regulation must also contain test procedures in order to determine whether sources are in compliance." This section of the measure identifies appropriate approved District, ARB, and EPA source test methods.

Cost Effectiveness

The Discounted Cash Flow (DCF) method is used to calculate the cost-effectiveness of each control measure. As control measures undergo the rule making process, more detailed control costs will be developed, and therefore, may differ from the data presented here.

The cost effectiveness may overestimate actual levels because the number of affected facilities may also include those that presently are not regulated by the District. As additional information on costs and more accurate numbers of affected facilities becomes available, the cost effectiveness will be revised and analyzed in the socioeconomic assessment report of the draft 2003 AQMP.

Implementing Agency

This section identifies the agency(ies) responsibility for implementing the control measure. Also included in this section is a description of any jurisdictional issues that may affect the control measure's implementation.

References

This section identifies directly cited references, or those references used to provide general background information.

GROUP 1

COATINGS AND SOLVENTS

FURTHER EMISSION REDUCTIONS FROM ARCHITECTURAL COATINGS AND CLEANUP SOLVENTS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ARCHITECTURAL COATINGS, THINNING AND CLEAN-UP SOLVENTS

CONTROL METHODS: NEAR-ZERO OR ZERO-VOC COATING FORMULATIONS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1997**	**2006**	**2010**
VOC INVENTORY	50.9	32.7	24.0
VOC REDUCTION		3.3	7.2
VOC REMAINING		29.4	16.8
SUMMER PLANNING INVENTORY	**1997**	**2006**	**2010**
VOC INVENTORY	60.0	38.5	28.3
VOC REDUCTION		3.9	8.5
VOC REMAINING		34.6	19.8

CONTROL COST: $20,100 PER TON OF VOC

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure proposes to further reduce VOC emissions from various architectural coating categories and thinning and cleanup solvents used in this industry. This control measure was part of the 1999 Amendment to the 1997 Ozone SIP Revision for the South Coast Air Basin.

Background

Architectural Industrial Maintenance (AIM) coatings are used to beautify and protect homes, office buildings, factories, and their appurtenances on a variety of surfaces - metal, wood, plastic, concrete, wallboard, etc. These coatings are applied to the interior and exterior of homes and offices, factory floors, bridges, stop signs, roofs, swimming pools, driveways, etc. AIM coatings may be applied by brush, roller or spray gun; by consumers, painting contractors, or maintenance personnel.

Despite existing regulations, AIM coatings still represent one of the largest non-mobile sources of VOC emissions in the Basin. Because AIM coating surfaces cannot be painted within an enclosure vented to an air pollution control device, the only cost-effective method to control VOC emissions from AIM coatings is to reduce the VOC content of the coatings.

Control Measure #CTS-07 was included in the 1994 and 1997 AQMPs as well as the 1999 amendment to the 1997 ozone SIP. This control measure proposed to reduce VOC emissions through the establishment of lower VOC-limits and the expansion of the applicability of Rule 1113. At that time, the proposed reduction target for this control measure was set at 75 percent. Control Measure #CTS-07 has been implemented, in part, with the amendments to Rule 1113 in 1996 and 1999 which have achieved greater than 50 percent emission reduction from this source category.

Regulatory History

District Rule 1113 - Architectural Coatings, was originally adopted on September 2, 1977, to regulate VOC emissions from the application of architectural coatings. Since its adoption, the rule has been amended numerous times to incorporate more stringent VOC limits as technology for lower-VOC coatings has become available. The November 1996 amendment to Rule 1113 implemented both Control Measure #94CTS-07 and Phase I of Control Measure #97CTS-07. This amendment lowered the VOC limits for some coating categories based on the concept of coating reformulation, increased the VOC limit for other coating categories, and addressed issues raised since the amendments of September 6, 1991. The amendment to Rule 1113, adopted on May 14, 1999, implemented Phase II of the Control Measure #97CTS-07 by lowering interim and final VOC limits for new and existing coating categories.

Following the adoption of the 1999 amendments, three lawsuits were filed against the District relative to Rule 1113 which were subsequently consolidated as one matter by the court. Ultimately, the appellate court ruled that the May 14, 1999, amendments were improperly adopted due to inadequate noticing of the public hearing. On December 6, 2002, in response to the ruling from the appellate court, the May 14, 1999, amendments were readopted following proper procedures along with changes resulting from the new proposed compliance dates of January 1, 2003, and January 1, 2004, for the interim rule limits and other clarifying changes was brought to the Governing Board in December, 2002.

Subsequent to the May 14, 1999 amendments to Rule 1113, CARB developed a revised suggested control measure (SCM) in June 2000 for architectural coatings that was largely based on the interim limits and the averaging provision of Rule 1113. The SCM, which has January 1, 2003 as the main compliance date for most coating categories, has been adopted by 16 of the 35 local air districts in California.

U.S. EPA finalized a national architectural coatings rule in September 1998. The National Rule went into effect throughout the country, including all California districts, on September 13, 1999. The National Rule contains over 20 categories that are not typically included in district rules. In addition, for many of the categories that are in both the district rules and the National Rule, the National Rule has definitions that differ significantly from those of the district rules and VOC limits that generally are equal to or less stringent than existing district rules.

PROPOSED METHOD OF CONTROL

Implementation of Phase 3 of Control Measure CTS-07 will rely on near-zero or zero VOC formulations for several architectural coating categories including, but not limited to, cleanup and thinning solvents, clear wood finishes, exterior opaque stains, semi-transparent stains, sanding sealers, and waterproofing sealers. Control Measure CTS-07(P3), presented here, seeks to achieve the emission reductions necessary to attain the same level of remaining emissions as set forth in the 1999 Amendments to the 1997 Ozone SIP. On-going technical evaluation of coating performance and research to further develop low-VOC and/or low-reactive coating or clean-up materials can provide further reduction opportunities.

EMISSIONS REDUCTION

The estimated emission reductions for 2006 and 2010 are summarized in the Control Measure Summary. The 2010 emission inventory (summer planning inventory) for this category is estimated to be 28.3 tons of VOC per day. Control Measure #2003CTS-03 (P3) is estimated to achieve 8.5 tons of VOC per day reduction from this baseline. This control measure was estimated to have a range of reduction potential from 8 to 9 tons of VOC per day. The lower end of the reduction is used in the draft 2003 AQMP, pending further feasibility analysis.

RULE COMPLIANCE

This control measure would incorporate rule compliance requirements similar to those identified in Rule 1113.

TEST METHODS

Test methods include the following:

- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- ASTM Test Method D1613-85 - Determination of Acid Content of Coating;
- District Method 303, 304, 311, and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this control measure is calculated to be approximately $20,100 per ton. This value is based on an incremental reformulation cost of $8.00 per gallon for the architectural coating categories targeted by this control measure.

IMPLEMENTING AGENCY/SCHEDULE

The District has authority to regulate VOC emissions from architectural coating categories.

MISCELLANEOUS INDUSTRIAL COATINGS AND SOLVENT OPERATIONS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: MISCELLANEOUS INDUSTRIAL COATINGS AND SOLVENT OPERATIONS

CONTROL METHODS: STEP I: INVENTORY AND TECHNICAL ASSESSMENT

STEP II: DEVELOPMENT AND IMPLEMENTATION OF CONTROL STRATEGIES INCLUDING, BUT NOT LIMITED TO, NEAR-ZERO OR ZERO-VOC COATING AND SOLVENT FORMULATIONS AND ADD-ON CONTROLS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1997**	**2006**	**2010**
VOC INVENTORY	13.7	13.9	15.2
VOC REDUCTION		0.9	2.8
VOC REMAINING		13.0	12.4
SUMMER PLANNING INVENTORY	**1997**	**2006**	**2010**
VOC INVENTORY	14.5	14.9	16.3
VOC REDUCTION		0.9	3.0
VOC REMAINING		14.0	13.3

CONTROL COST: UP TO $13,500 PER TON OF VOC

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Control Measure #CTS-10 is a new control measure that seeks to reduce emissions from sources under Control Measure #99 ADV-CTS, which was part of the 1999 Amendment to the 1997 Ozone SIP Revision for the South Coast Air Quality Basin, as well as other sources that may or may not already be subject to Regulation IV or Regulation XI rules. Control Measure #99 ADV-CTS included miscellaneous industrial coating and solvent operations.

Background

Consistent with state and federal law, the District maintains an emissions inventory for a wide variety of source categories and industries. The emissions inventory for the Basin includes nearly 180 different major source categories and, within these major categories, there are multiple source categories that are further defined. The miscellaneous industrial coating and solvent operations targeted for this control measure represent all industrial coating and solvent categories covered under Regulation IV and Regulation XI rules as well as other miscellaneous source categories that are not yet regulated. In

addition, Level II contingency control measures identified in the 1997 AQMP (presented in the next table) will also be evaluated under this control measure.

Table of Level II
VOC Contingency Control Measures from 1997 AQMP

AQMP Measure Number	Title	Pollutant
CTS-02A	Emission Reductions from Electronic Components Manufacturing	VOC
CTS-02D(1)	Further Emission Reductions from Marine Coating Operations (Rule 1106)	VOC
CTS-02D(2)	Further Emission Reductions from Pleasure Craft Coating Operations (Rule 1106.1)	VOC
CTS-02G	Further Emission Reductions from Paper, Fabric, and Film Coating Operations (Rule 1128)	VOC
CTS-02I(1)	Further Emission Reductions from Screen Printing Operations (Rule 1130.1)	VOC
CTS-02J	Further Emission Reductions from Wood Products (Rule 1136)	VOC
CTS-02K	Further Emission Reductions from Aerospace Assembly and Component Manufacturing Operations (Rule 1124)	VOC
CTS-02L	Further Emission Reductions from Motor Vehicle Assembly Line Coating Operations (Rule 1115)	VOC
PRC-02	Further Emission Reductions from Bakeries (Rule 1153)	VOC
PRC-05	Emission Reductions from Malt Beverage Production Facilities and Wine or Brandy Making Facilities	VOC

The objective of this control measure is to further assess emissions from miscellaneous industrial coating and solvent operations. An inventory and technical assessment will be conducted to seek further emission reduction opportunities from these categories. The assessments will identify those emissions within these source categories that can be controlled in a cost-effective manner under an existing rule or regulation or those emissions that require the development of new rules. Based on the results of the assessments, the District will develop and implement specific strategies (e.g., reformulation, control equipment, etc.) to reduce VOC emissions. Some of the solvent operation categories that need to be further assessed include, but are not limited to, aerospace handwipe operations, lubricants (e.g., diluted with mineral spirits and vanishing oils), and use of alcohol or other solvents in manufacturing and clean

room maintenance. Other categories such as janitorial supplies, aerosols, and other consumer products are under CARB's jurisdiction.

Regulatory History

Currently, the District has a number of specific rules for various categories of coatings and solvents. The source categories under this control measure represent a wide variety of industrial coating and solvent operations. The type of operation, industry, and size of the source would determine which rule(s) or regulation(s) that these sources would be regulated under.

PROPOSED METHOD OF CONTROL

Based on current information regarding miscellaneous industrial coatings and solvents, this control measure would be implemented in two steps. The first step represents assessment of various industrial coatings and solvents categories to determine where additional emission reductions may be feasible. Based on the results of the first step, the appropriate control strategies to reduce VOC emissions beyond existing rules and regulations would be developed, based on near-zero or zero-VOC coating and solvent formulations and technologies (e.g., water-based, UV coatings, powder coatings, add-on controls). Implementation of this control measure is expected to be conducted in several separate rulemaking phases with an overall VOC reduction target of three tons per day by 2010.

Significant advancements have been made relative to the development and application of zero- or near-zero VOC coating formulations. Powder coatings, UV coatings for various substrates, zero-VOC interior flat architectural coating materials, as well as waterborne lacquers for wood products, are examples of technological advancements that have developed over the 5 to 10 years. Also, since this control measure is partially targeting small and unpermitted sources, in addition to the proposed control methods, innovative implementation mechanisms are also needed to successfully carry out the control program. Reactivity issues for VOC-containing materials associated with this control measure will also be reviewed.

EMISSIONS REDUCTION

The estimated emission inventory and emission reductions are summarized in the Control Measure Summary. This control measure was estimated to have a range reduction potential from 3 to 5 tons of VOC per day. The lower end of the reduction is used in the draft 2003 AQMP, pending further feasibility analysis.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under Regulation XI - Source Specific Rules. Recordkeeping and monitoring requirements would be similar to Rule 109.

TEST METHODS

Test methods include the following:

- U.S. EPA Test Methods 2, 2A, 2C, or 2D, measurements of ventilation rate in a hood or enclosure and District Method 1.1, measure of traverse points;
- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- U.S. EPA Test Method 25, 25A, or District Method 25.1 for the determination of total organic compound emissions;
- ASTM Method D2879;
- ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids;
- ASTM Test Method D1613-85 - Determination of Acid Content of Coating;
- District Method 303, 304, 313, 308, 311, and 313; and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been specifically determined, but is expected to be no more than $13,500 per ton of VOC reduced. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide specific cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY/SCHEDULE

The District has authority to regulate VOC emissions from industrial coating and solvent operations.

GROUP 2

Petroleum Operations and Fugitive VOC Sources

EMISSION REDUCTIONS FROM FUGITIVE SOURCES [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: FUGITIVE EMISSION SOURCES

CONTROL METHODS: STEP I: CHARACTIZATION AND QUANTIFICATION OF EMISSIONS

STEP II: TECHNOLOGY ASSESSMENT AND DEVELOPMENT AND IMPLEMENTATION OF CONTROL STRATEGIES INCLUDING, BUT NOT LIMITED TO, ADD-ON CONTROLS, IMPROVED INSPECTION AND MAINTENANCE PROGRAMS, AND PROCESS CHANGES

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1997**	**2006**	**2010**
VOC INVENTORY	18.2	16.7	14.8
VOC REDUCTION		1.1	2.0
VOC REMAINING		15.6	12.8
SUMMER PLANNING INVENTORY	**1997**	**2006**	**2010**
VOC INVENTORY	18.3	16.9	15.0
VOC REDUCTION		1.1	2.0
VOC REMAINING		15.8	13.0

CONTROL COST: UP TO $13,500 PER TON OF VOC

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Control Measure #FUG-05 is a new control measure that groups together three control measures that were part of the 1999 Amendment to the 1997 Ozone SIP Revision for the South Coast Air Basin. The control measures combined herein include: Control Measure #99FUG-04 – Further Control of Emissions from Fugitive Sources; Control Measure #99FUG-05 – Further Emission Reductions from Large Fugitive VOC Sources; and, Control Measure #99ADV-FUG – Long-Term Control for Fugitive Emissions.

The emission sources targeted under this control measure include a variety of fugitive emissions sources including, but not limited to, oil and gas production facilities, petroleum and chemical products processing and transfer facilities, refinery terminals, and other sources contributing to fugitive emissions.

Background

Control Measure #99FUG-04 targeted VOC emission reduction from fugitive sources from petroleum- and chemical-related industries in general, including refineries, oil and gas production fields,

natural gas processing plants and pipeline transfer stations. Control Measure #99FUG-04 also called for an emissions inventory evaluation for these sources and the development of control options, if necessary.

Control Measure #99FUG-05 focused on reducing emission from the top 100 non-coating/solvent-related VOC-emitting facilities. The type of facilities targeted under this control measure included: gasoline refineries and terminals, oil and gas production facilities, chemical plants, and manufacturing facilities. In 1993, the population of facilities targeted in this control measure constituted only two percent of the total population of stationary point sources while contributing approximately 34 percent of the total VOC emissions inventory from stationary point sources.

Control Measure #99ADV-FUG was a long-term control measure included in the 1999 amendment to the 1997 Ozone SIP for the South Coast Air Basin and was intended to further reduce emissions from the source categories described in the control measures described above.

Regulatory History

Fugitive emissions are currently regulated under various AQMD rules including Rules 461 – Gasoline Transfer and Dispensing, 462 – Organic Liquid Loading, 463 – Storage of Organic Liquids, 1173 – Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum and Chemical Plants, 1176 – Sumps and Wastewater Separators, and 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities.

Rule 1178, adopted in December 2001, implemented Control Measures #99FUG-03 – Further Emission Reductions from Floating Roof Tanks and portions of #99FUG-04 and Phase I of Control Measure #99FUG-05. Rule 1178 would achieve, upon full implementation, VOC emission reductions of 1.4 tons per day by reducing evaporative emission losses and minimizing leaks from external floating roof tanks, internal floating roof tanks, fixed roof tanks and pressure-vacuum vents at specified petroleum facilities.

Proposed Rule 1173, was amended in December 2002, to implement the remainder of Control Measure #99FUG-04 and Phase II of Control Measure #99FUG-05. These amendments further reduce fugitive VOC emissions from components at petroleum facilities and chemical plants by requiring an inspection and repair program for heavy liquids (that are currently exempt), and reducing the leak thresholds and time to repair components in light liquid service. The amendments also required the monitoring and reporting of releases from pressure relief devices. The amendments are expected to achieve reductions of 0.57 tons of VOC per day.

PROPOSED METHOD OF CONTROL

This measure will implement CM#99 ADV-FUG, the remaining portion of CM#99 FUG-04, and CM#99 FUG-05 (P2) and (P3).

This control measure will be implemented in two steps: 1) the development of data to characterize and quantify fugitive VOC emissions from the petroleum, chemical-related industries, and other

manufacturing and 2) the assessment of technology to determine the availability and feasibility of technological solutions and the design and implementation of cost-effective control options that would further reduce fugitive VOC emission from these industries. Potential controls include, but are not limited to, enhanced inspection and maintenance programs, leakless valves, vapor recovery devices, and control equipment (e.g., for tank degassing).

The emission reductions associated with the December 6, 2002 amendments to Rule 1173, will be credited toward the reductions targeted in this control measure.

EMISSIONS REDUCTION

Emission inventory and estimated reductions are summarized in the Control Measure Summary. The proposed control measure is expected to achieve at least two tons per day VOC reductions in 2010. This control measure was estimated to have a range of reduction potential from 2 to 7 tons of VOC per day. The lower end of the reduction is used in the draft 2003 AQMP, pending further feasibility analysis.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under existing Rules 461, 462, 463, 1173, 1176, and 1178. Recordkeeping and monitoring requirements would be similar to Rule 109.

TEST METHODS

Test methods include the following:

- U.S. EPA Method 18 – Measurement of Gaseous Organic Compound Emission by Gas Chromatography, for use in Determining Efficiency of Vapor Recovery Systems.
- U.S. EPA Test Method 21 - Determination of Volatile Organic Compounds Leaks, for use in Determining Vapor Tightness.
- U.S. EPA Test Method 25 – Determination of Total Gaseous Non-methane Organic Emissions as Carbon.
- U.S. EPA Test Method 25A – Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer.
- ASTM Method 1078 – Organic Liquid Storage for use in determining the true vapor pressure limits.
- ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids;
- SCAQMD Test Method 25.1 - Determination of Total Gaseous Non-Methane Organic Emissions as Carbon.

- SCAQMD Test Method 50.1 – Determination of Total Non-Methane Organic Vapors from Organic Loading and Storage, for use in Determining Efficiency of Vapor Recovery Systems.
- SCAQMD Test Method 303 – Determination of Exempt Compounds, for use in Determining Exempt Compounds
- SCAQMD Test Method 315 – Determination of Hydrogen Sulfide Mercaptan in Oil and Sludge Samples, for use in Determining Hydrogen Sulfide Concentrations in Crude Oils.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been specifically determined, but is expected to be no more than $13,500 per ton of VOC reduced. The overall cost effectiveness of Rule 1178 was estimated at $9,600 to $11,000 per ton VOC emissions reduced which is assumed to be at the high end of the likely cost-effectiveness of Control Measure FUG-05. The cost-effectiveness of Rule 1173 amended on December 6, 2002, was estimated to be approximately $150 per ton of VOC reduced. This value represents a weighted average of the costs of the control requirements, with the greatest weight afforded to additional inspection and maintenance programs set forth in the amendments.

The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide specific cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has authority to regulate fugitive VOC emissions sources.

GROUP 3

Combustion Sources

EMISSION REDUCTIONS FROM PETROLEUM REFINERY FLARES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	REFINERY FLARES		
CONTROL METHODS:	STEP I—INVENTORY ASSESSMENT STEP II—DEVELOPMENT AND IMPLEMENTATION OF CONTROL TECHNOLOGIES		
EMISSIONS:	NOT DETERMINED		
ANNUAL AVERAGE	**1997**	**2006***	**2010***
SO_X INVENTORY	4.4	4.3	4.3
SO_X REDUCTION		2.1	2.1
SO_X REMAINING		2.2	2.2
CONTROL COST:	NOT DETERMINED		
IMPLEMENTING AGENCY:	SCAQMD		

* Only SO_x emissions are estimated, however there will be concurrent VOC, NO_x, CO, and PM10 emission reductions from this control measure.

DESCRIPTION OF SOURCE CATEGORY

Background

This control measure is targeted at flares at refineries and is not intended for flares at landfills. Blowdown systems are designed and installed at petroleum refineries to provide for safe containment or safe release of liquids and gases that must be vented. These systems are used for emptying and venting vessels during scheduled maintenance and turn-around or during emergency upsets. Such systems generally consist of a series of venting manifolds which lead from the process equipment to a blowdown recovery subsystem (e.g., storage tanks) and flares.

Flares are incendiary devices which ensure safe combustion of waste gases when the blowdown volume exceeds the storage capacity of the recovery subsystem. Thus, they provide the last opportunity to treat blowdown gases before they are released into the atmosphere.

The completeness of combustion in flares is determined by flame temperature, residence time in the combustion zone, turbulent mixing of the components to complete the oxidation process, and available oxygen for free radical formation. If the combustion is complete, there is greater than 98 percent VOC destruction (EPA, April 1991) and the VOCs are converted to carbon dioxide and water. However, if there is incomplete combustion, some of the VOCs remain unaltered or are converted to other organic compounds (e.g. aldehydes or acids). In addition to VOCs being emitted during incomplete combustion, the flaring process can emit SO_x, NO_x, CO, and PM10.

Regulatory History

Measure A15 of the 1982 AQMP Revision proposed increasing the use of blowdown recovery systems to reduce emissions from flare operations. Measure A15 was originally scheduled for adoption in 1985. Consideration of adoption, however, was postponed to provide additional time to collect background information regarding flare operations and alternative control options. The ARB, the District, and other local air pollution control districts have worked to collect this information.

In 1984, the ARB contracted with CH_2M Hill, an engineering firm, to evaluate the feasibility of continuously monitoring petroleum refinery flare emissions. Based on CH_2M Hill's analysis and public testimony, the ARB has determined that monitoring devices are technologically feasible, available, and economically reasonable to identify and record continuously the on/off status of refinery flares to determine refinery flare emissions. The ARB also directed its staff to work with local districts to develop rules requiring the use of these devices and to encourage districts to require refiners to provide grab sample composition analysis of flare feed stream gases. In 1986, the ARB handed this project over to the local air pollution districts.

Santa Barbara County Air Pollution Control District (SBAPCD) adopted Rule 359, Flares and Thermal Oxidizers, on June 28, 1994. The rule requires flare operators to minimize flare gas volume, use technology standards on open flares and limit fuel sulfur content for outer continental shelf (OCS) sources. It also requires reduction in planned flaring and limits emissions for thermal oxidizers.

Federal Regulations (CFR) 60.18, Revision 1987, sets New Source Performance Standards (NSPS) for flares that operate continuously or for emergency purposes. The NSPS for new flare systems is a 98 percent combustion efficiency. The Best Available Control Technology (BACT) Guidelines listed as "Achieved in Practice, or Contained in EPA Approved SIP" for refinery flares are: ground level, shrouded and steam assisted.

In January 1998, the District Governing Board adopted Rule 1118 – Emissions from Refinery Flares in order to implement Step 1 of Control Measure #97CMB-07. Rule 1118 required petroleum refinery operations to monitor, record, and report data on gas flaring operations.

PROPOSED METHOD OF CONTROL

This measure would consist of a two-step approach. During Step I, data collected from implementing Rule 1118 would be evaluated and assessed to develop an accurate emissions inventory from flare operations. The District is currently in the process of implementing Step I. Emission data from the implementation of Rule 1118 has been received and is being evaluated to determine the source of emissions and to develop an emissions inventory.

If flare operations are determined to represent a significant source of emissions, Step II of the control measure will be implemented. Step II will consist of a thorough investigation of control options to identify the most feasible and cost-effective control strategies available to reduce emissions from refinery flares. The District will work with refineries to identify appropriate control options. Control options could include physical modifications and improvements to operation and maintenance procedures to prevent or minimize upset conditions. Control options may also include implementation

of flaring minimization plans. Regardless of the control option, the District will ensure that safety considerations are taken into account. Completion of Steps I and II are expected to occur by 2004.

EMISSIONS REDUCTION

The emissions reduction from this source category will be determined at a later date based on the results of Step I studies and the control option(s) selected. Based on a preliminary analysis, the emissions inventory for SO_x is shown in the summary table. Based on preliminary data, it is estimated that this control measure will result in an overall reduction of 50% through better management practices to minimize unnecessary flaring. There will also be concurrent emission reductions in VOC, NO_x, CO, and PM10.

RULE COMPLIANCE

Compliance with this control measure would depend on the control requirements for flare operations developed in Step II. Implementation of proposed control could be either through a source specific rule or MOU with individual facilities to seek maximum emission reductions while considering potentially unique operating constraints.

TEST METHODS

Any source test (or monitoring) shall follow EPA or approved District guidelines or Test Methods. Alternate guidelines may be used, provided they are first approved by the EPA, ARB, and the District. Source test methods used for Rule 1118 compliance would be applicable under this control measure. These include:

- The higher gross heating value of bent gasses shall be determined by ASTM Method D 2382-88, ASTM Method D 3588-91, or ASTM Method D 4891-89

- The total sulfur content shall be determine by District Method 307-91 or ASTM Method D 5504-94

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from petroleum refinery flares.

REFERENCES

Santa Barbara County Air Pollution Control District. Proposed Rule 359 Staff Report. June 24, 1994.

South Coast Air Quality Management District. Final Air Quality Management Plan. October 1982.

United States Environmental Protection Agency, OAOPS Control Cost Manual (Fourth Edition), Chapter 7: "Flares," April 1991.

Western States Petroleum Association. Meeting with SCAQMD. June 28, 1994

EMISSION REDUCTIONS FROM PETROLEUM FLUID CATALYTIC CRACKING UNITS [PM10, PM2.5 AND NH_3]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	PETROLEUM REFINERY FCCUS		
CONTROL METHODS:	CONTROL TECHNOLOGIES FOR PARTICULATE MATTER AND PRECURSORS OF PARTICULATE MATTER SUCH AS SO_X AND AMMONIA (E.G., DRY OR WET ELECTROSTATIC PRECIPITATORS (ESP), SO_X REDUCING CATALYSTS, WET SCRUBBERS, SELECTIVE OR NON-SELECTIVE CATALYTIC REDUCTION (SCR OR NSCR), BAGHOUSES, ALTERNATIVES TO AMMONIA INJECTION, AND/OR FEED HYDRODESULFURIZATION).		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1997***	**2006***	**2010***
PM10 INVENTORY	6.0	6.0	6.0
PM10 REDUCTION		TBD	4.6
PM10 REMAINING		TBD	1.4
CONTROL COST:	$3,500 - $11,500 PER TON PM10 REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

* 5.3 tons/day of the emissions inventory and 4.1 tons per day of the reduction is from condensables

DESCRIPTION OF SOURCE CATEGORY

Background

Six petroleum refineries in the Basin currently operate fluid catalytic cracking units (FCCUs). Catalytic cracking is the most important and widely used refinery process for converting heavy oils into more valuable gasoline and lighter products. The process uses a very fine aluminum silicate catalyst commonly called zeolite that behaves like a fluid when aerated with a vapor. The fluidized catalyst is circulated continuously between a reactor and a regenerator and acts as a vehicle to transfer heat from the regenerator to the oil feed in the reactor. The cracking reaction is endothermic and the regeneration reaction is exothermic.

As the cracking reaction progresses, the catalyst surface is gradually coated with carbon (coke) which eventually deactivates the cracking catalyst. To remove the coke deposited, the spent catalyst is routed to the regenerator. In the regenerator, the coke is burned off with air and the spent catalyst is reactivated. The regenerator can be designed and operated to either partially burn the coke on the catalyst to a mixture of carbon monoxide (CO) and carbon dioxide (CO_2), or completely burn the coke to CO_2. The flue gas containing high levels of CO from the regenerator is routed to a CO boiler that uses supplemental fuel to burn off the CO to CO_2 and generate steam. Some regenerators in the District are operated in a completely burn mode, the CO boiler in this case is used as a heat exchanger without the consumption of supplemental fuel.

It is during the regeneration cycle that much of the catalyst is lost in the form of catalyst fines escaping the regenerator with the flue gas. To recover the regenerated catalyst, the flue gas is routed to a series of cyclones and electrostatic precipitators (ESPs). Some refineries in the District inject ammonia in the flue gas to increase the gas stream's resistivity and the particles' cohesiveness with the hope to enhance the particle removal efficiency of the ESPs. After passing through the ESPs, the flue gas leaves stack at about 500-700^{o}F. The flue gas typically contains sulfur oxides, nitrogen oxides, particulate matter, ammonia, water vapor, and oxygen.

1996-1997 Source Test Results and Installation of New ESP in 1993

In 1996-1997, in order to determine the PM and PM10 inventory for FCCUs, the Western States Petroleum Association (WSPA) coordinated intensive testing at six operating refineries in the District using a combination of SCAQMD Method 5.2 and EPA Method 201A. Most important aspects of the test results are:

— Total PM and PM10 measured from the six existing FCCUs were 6.17 tons/day and 6.07 tons/day, respectively. The test results showed that more than 98% of the particulate matter emitted from the six FCCU regenerators were PM10.

— The total filterable PM collected on the in-stack filter and out-of-stack filter was about 0.74 ton/day, while the remaining of the PM10 was condensable particulate matter formed as the flue gas was cooled down in the sampling train or in the atmosphere. The test results suggested that it is extremely important to measure and account for the condensable particulate matter formed at the temperature regimes below stack temperatures. Furthermore, the test results suggested that condensable particulate matter formed at lower temperature regimes, can be effectively reduced by focusing on control technologies for precursor of particulate matter such as sulfur oxides and ammonia.

— Two refineries achieved extremely low overall particulate matter emissions during the 96-97 tests. One refinery used SO_x reducing catalysts to reduce SO_x emissions, and the other did not use ammonia to enhance its ESP's efficiency when the tests were conducted. The 96-97 test results from these two refineries suggested that using SO_x reducing catalyst or reducing the amount of ammonia injection could be viable control options for particulate matter from FCCU's regenerators.

In 1993, one refinery in the District replaced its dry ESP with a brand new, larger capacity ESP that has manufacturer's guarantee for a mass emission rate of 3-lbs/hr filterable particulate matter. This refinery also uses SO_x reducing catalyst. The testing in 2001 and 2002 showed that this refinery achieved extremely low filterable and condensable particulate matter emissions, even lower than the emissions achieved at the two refineries mentioned above in 1996-1997. The particulate emission reduction for this control measure therefore could be based on the emission levels achieved at these three refineries.

Direct sampling for ammonia emissions was not performed during the 1996-1997 tests coordinated by WSPA. However, several tests conducted by the District showed that the ammonia emissions from each FCCU could vary from 10 lbs/hr to 125 lbs/hr depending on the amount of ammonia injection rate at the time of testing. The inventory of ammonia from FCCUs has not yet been determined.

Regulatory History

Particulate matter emissions from FCCUs are not currently regulated under a source-specific District rule. The refineries are required to apply for permit to construct and operate FCCUs pursuant to Regulation II. FCCUs are currently regulated under District Rules 401, 402, 404 and 405. Rule 401 regulates visible emissions of any air contaminant discharged into the atmosphere; Rule 402 limits discharge from FCCUs that may cause a public nuisance; Rule 404 and Rule 405 regulate the particulate matter emissions based on concentration and weight criteria, respectively. In addition, EPA's New Source Performance Standards (NSPS) CFR 40, Part 60, Subpart J sets forth emission limits for any FCCU constructed after January 17, 1984. And EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) CFR Part 63, Subpart UUU sets forth emission limits for any FCCU that is located at a major source of HAP emissions.

The District is currently developing Proposed Rule 1105.1 – Reduction of PM10 and Ammonia Emissions From Fluid Catalytic Cracking Units. Proposed Rule 1105.1 is designed to implement the 1997 AQMP Control Measure CM #97CMB-09. Specifically, Proposed Rule 1105.1 will specify emission standards for primary and secondary PM10 and ammonia slip, as well as require annual source tests and applicable monitoring, recordkeeping, and reporting requirements. Proposed Rule 1105.1 is scheduled for adoption in early 2003.

PROPOSED METHOD OF CONTROL

The proposed technologies of additional control for particulate matter and precursors of particulate matter from FCCUs are technologies such as dry or wet electrostatic precipitators (ESP), SO_x reducing catalysts, wet scrubbers, selective or non-selective catalytic reduction (SCR or NSCR), baghouses, alternatives to ammonia injection, and/or feed hydrodesulfurization.

EMISSION REDUCTION

The projected PM10 inventories for 1997, 2006, and 2010 are provided in the Control Measure Summary. The projected PM10 inventories for FCCUs exclude condensable particulate matter since the condensable portion of PM10 emissions were not originally included in the baseline emissions inventory. However, based on the 1996-1997 test results which include the entire profiles of filterable and condensable particulate matter from FCCU's regenerators, the total PM10 emissions are estimated to be 6 tons per day of which condensable particulate matter accounts for 5.3 tons per day. The emission reduction estimated for this control measure is based on the second lowest emission level achieved by the refineries in the 1996-1997 tests. This control measure is expected to provide an overall rule effectiveness of approximately 76 percent for particulate matter. The 2010 emission

reductions would be 4.6 tons per day of PM10 if condensables are included, of which 0.5 tons per day are filterable particulate matter.

RULE COMPLIANCE

Compliance with this control measure may be determined and verified by source testing, monitoring operating parameters to ensure continuous compliance, record keeping and reporting requirements. Test reports should include at a minimum important operating parameters such as stack temperature, flue gas flow rate, ammonia injection rate, feed rate, sulfur content of feed, type and amount of SO_x reducing catalyst used, and coke burn off rate.

TEST METHODS

Monitoring or source testing for particulate matter would follow EPA or approved District guidelines or test methods such as District Method 5.2, District Method 6.1, District Draft Method 207.1, EPA Method 201, EPA Method 201A, EPA Method 202 and EPA Conditional Test Method CTM-027. Alternative guidelines or test methods may be used, provided that EPA, ARB, and the District have first approved them.

COST EFFECTIVENESS

The cost effectiveness (incremental) of this control measure has estimated to be $3,500 - $11,500 based on replacing current ESPs with brand new ESPs. The District will continue to analyze the potential cost impact associated with implementing this control measure and will revise the cost effectiveness information, as it becomes available.

IMPLEMENTING AGENCY

The District has authority to regulate emissions from petroleum refineries.

REFERENCES

Almega – Source Test Report - Determination of Particulate Matter and PM10 Emissions from Refinery Fluid Catalytic Cracking Unit - Mobil Oil Corporation, Almega Environmental & Technical Services Inc., October 1996. (SCAQMD ASTD Source Test File #97010).

Almega – Source Test Report - Determination of Particulate Matter and PM10 Emissions from Refinery Fluid Catalytic Cracking Unit - Texaco Refining and Marketing Inc., Almega Environmental & Technical Services Inc., August 1996. (SCAQMD ASTD Source Test File #97011).

Almega – Source Test Report - Determination of Particulate Matter and PM10 Emissions from Unit 61-ST-1 - Ultramar Inc., Almega Environmental & Technical Services Inc., October 1996. (SCAQMD ASTD Source Test File #97009).

Carnot – Particulate Matter Source Test Results. Prepared for Arco Los Angeles Refinery, Carnot, December 1996. (SCAQMD ASTD Source Test File #97047).

Energy – Source Testing to Determine PM10 and Particulate Matter Emissions from a Refinery FCCU Equipped with an ESP and CO Boiler - Chevron Products Company, Energy and Environmental Research Corporation, May 1997. (SCAQMD ASTD Source Test File #R97215).

EPA – Operation and Maintenance Manual for Electrostatic Precipitators, U.S. EPA, EPA/625/1-85/017, 1985.

EPA – Stationary Source Control Techniques Document Technique for Fine Particulate Matter, U.S. EPA, NTIS PB99-116493, October 1998.

EPA – 40 CFR Part 51, Preparation, Adoption, and Submittal of State Implementation Plans, Method for Measurement of Condensable Particulate Emissions from Stationary Sources, Final Rule, Federal Register, Volume 56, No. 242, Page 65433-38, December 1991.

EPA – Method 201, Determination of PM10 Emissions – Exhaust Gas Recycle Procedures, U.S. EPA, 40 CFR Part 51, Appendix M, 1991.

EPA – Method 201A, Determination of PM10 Emissions - Constant Sampling Rate Procedures, U.S. EPA, 40 CFR Part 51, Appendix M, 1991.

EPA – Method 202, Determination of Condensable Particulate Emissions from Stationary Sources, U.S. EPA, 40 CFR Part 51, Appendix M, 1991.

EPA – Conditional Test Method CTM-027.

SCAQMD – Method 5.2, Determination of Particulate Matter Emissions from Stationary Sources Using Heated Probe and Filter, March 1989.

SCAQMD – Method 6.1, Determination of Sulfuric Acid and Sulfur Oxides from Stationary Sources, March 1989.

SCAQMD – Draft Method 207.1, Determination of Ammonia from Stationary Sources.

SCAQMD – Final Air Quality Management Plan, 1997.

STAPPA/ALAPCO – Controlling Particulate Matter under the Clean Air Act: A Menu of Options, July 1996.

ADDITIONAL REDUCTIONS FOR NO_X RECLAIM [NO_X]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	NO_X RECLAIM FACILITIES		
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1997**	**2006***	**2010***
NO_X INVENTORY	61.9	34.2	34.2
NO_X REDUCTION		TBD	TBD
NO_X REMAINING		TBD	TBD
CONTROL COST:	NOT DETERMINED.		
IMPLEMENTING AGENCY:	SCAQMD		

* The emission reduction target for this control measure is between 0 to 3 tons per day of NO_x in 2010

DESCRIPTION OF SOURCE CATEGORY

As of the end of the 2000 compliance year, there were approximately 335 NO_x facilities in the Regional Clean Air Incentives Market (RECLAIM) Program. The RECLAIM program includes facilities with NO_x emissions greater than or equal to four tons per year in 1990 or any subsequent year. NO_x facilities in the RECLAIM program have a wide range of equipment such as boilers, heaters, furnaces, ovens, kilns, internal combustion engines, and turbines.

This control measure identifies a series of control approaches that can be implemented if additional emission reductions are needed from the NO_x RECLAIM program. Depending on the control strategy implemented, this control measure may affect all NO_x RECLAIM facilities or a portion of the facilities based on their annual emissions or the type of equipment at the facility.

Background

Under the RECLAIM program, facilities are issued NO_x and/or SO_x allocations. Allocations decline annually until 2003, and remain constant thereafter. To meet their annual allocation, facilities have the option of installing pollution control equipment, changing operations, or purchasing RECLAIM Trading Credits (RTCs).

Additional emission reductions from RECLAIM may be needed to meet the federal "as expeditiously as practicable" and the state "all feasible measures" requirements. When the RECLAIM program was adopted, it was designed to achieve a Best Available Retrofit Control Technology (BARCT) level of emission reductions. As BARCT is updated to reflect improvements in pollution control equipment, additional reductions from the RECLAIM program may be possible.

During late 2000, the combination of the energy crisis and delayed installation of pollution control equipment resulted in high RTC prices. A series of mechanisms are now in place to stabilize RTC prices. As part of the rule amendment proceeding and program evaluation, both U.S. EPA and ARB have requested the District to revisit the ending allocation for the RECLAIM NO_x program.

Regulatory History

On October 15, 1993, the AQMD's Governing Board adopted the RECLAIM program. Regulation XX – RECLAIM includes 11 rules that specify the applicability, allocations, definitions, requirements, and monitoring, reporting, and recordkeeping requirements. When the RECLAIM program was adopted, it originally included 392 NO_x and 41 SO_x commercial and industrial facilities. Since the adoption of RECLAIM, there have been a number of amendments to the RECLAIM rules.

On May 11, 2001 amendments to RECLAIM were adopted by the AQMD's Governing Board to help stabilize RECLAIM Trading Credit (RTC) prices. This RECLAIM amendment represented the most significant change to the program as power producing facilities were removed from the RECLAIM market, compliance plans were required for larger facilities, and a reserve of emission reductions was established to mitigate emission increases from power plants and to increase the supply of RTCs for facilities meeting certain criteria. During the adoption of these amendments, the Governing Board directed staff to evaluate the compliance plans, determine whether additional backstop rules are needed to make-up emissions shortfalls, and provide recommendations to the Board regarding enhancements to the RECLAIM program.

In November 2001, the AQMD staff provided a status report on compliance plans and the need for backstop rules to make-up potential emission reduction shortfalls. It was determined that a shortfall may occur in 2003, however, emission reduction projects in the RECLAIM program may mitigate this emission reduction shortfall. If the possible shortfall cannot be mitigated or there are insufficient credits in the market for future growth, implementation of backstop rules will be needed.

PROPOSED METHOD OF CONTROL

There are a variety of approaches that can be implemented to achieve additional emission reductions from the RECLAIM program. The following identifies four types of approaches that can be used individually or collectively. The type of approach selected and the extent that the approach is implemented, will depend on a number of factors that include, but are not limited to:

- Technical feasibility of control option(s);
- Cost-effectiveness of the control option(s);
- Growth demand to accommodate new sources;
- Equity between sources; and
- Implementation issues.

Reduce Existing Ending Allocations

Under the RECLAIM program, initial allocations decline annually through the year 2003 and remain constant after 2003. This control option would seek further reductions in allocations from 2003 through 2010 and remain constant after 2010. Such reduction in allocations can be across-the-board shaving or source-specific. Similar to the existing RECLAIM program, facilities have the following options to meet their allocation: install pollution control equipment, process or other changes, or purchase RTCs.

Overlay Source-Specific Regulations

The RECLAIM rules exempt facilities from the source-specific NO_x rules and regulations that were subsumed into determination of allocations. This control approach could overlay source-specific requirements on the RECLAIM program. RECLAIM facilities would be required to operate within their annual allocation and meet source-specific emission limit requirements. Source-specific rules include, but are not limited to:

- R1109 - Refinery Boilers and Heaters
- R1110.2 - Internal Combustion Engines >50 Brake Horsepower
- R1117 - Glass Melting Furnaces
- R1112 - Cement Kilns
- R1134 - Gas Turbines
- R1135 - Electric Power Generating Systems
- R1146 - Boilers and Heaters >5 MM Btu/hour
- R1146.1 - Boilers and Heaters 2-5 MM Btu/hour
- R1146.2 - Boilers and Heaters <2 MM Btu/hour

This control approach can incorporate, in part or whole, requirements specified under individual source-specific BARCT rules. In addition, requirements from one, several, or all rules can be implemented, depending on the amount of emission reductions targeted.

Exclude Smaller Emitting Facilities

In general, the RECLAIM program applies to facilities with annual NO_x and/or SO_x emissions greater than or equal to four tons per year. This control option would exclude smaller emitting facilities from the RECLAIM market. Facilities that are excluded from RECLAIM would be transitioned to the command and control requirements and the facility cap under RECLAIM would be used for future NSR purposes.

Bifurcated Market for Powerplants and Non-powerplants

Based on the recent CEC forecast and the implementation of Rule 2009, existing power plants as a source category are likely to be net sellers. The District staff will be conducting an evaluation in 2003 to determine if the current trading restrictions imposed on the powerplants should be removed (i.e., rejoining the rest of RECLAIM market). In the interest of reducing overall RECLAIM allocation, it may be beneficial to continue to set-aside the power generation industry. Under this scenario, the unused RTCs would be retired to benefit clean air and, in essence, achieve additional reductions from

the RECLAIM program. The preliminary assessment indicated that the excess RTCs from the powerplants in 2010 based on the current RTC holdings could be up to 2 tons per day. More detailed analysis is warranted to examine the merit of this approach.

EMISSIONS REDUCTION

At this time, no specific emission reductions have been estimated from implementation of this control measure. The amount of additional emission reductions achievable through implementation of this control measure is subject to further technical assessment and AQMP growth project. The District staff will conduct further analysis as part of the assessment for the power plants and make recommendations to the Board as to determining the amount of additional emission reductions feasible from RECLAIM. For the purpose of a SIP commitment, 0 to 3 tons per day of NO_x reductions by 2010 is targeted with a linear declining balance between 2003 and 2010.

RULE COMPLIANCE AND TEST METHODS

Compliance with the provisions of this control measure would be based on monitoring, recordkeeping, and reporting requirements that have been established in either the RECLAIM program or existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information during rule development.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from stationary sources.

REFERENCES

South Coast Air Quality Management District, Board Letter for Report on Potential Backstop Measures to Stabilize NO_x RECLAIM Trading Credit Prices, January 19, 2001.

South Coast Air Quality Management District, Board Letter to Adopt Proposed Changes to RECLAIM, May 11, 2001.

South Coast Air Quality Management District, Board Letter for Potential Backstop Rule for Regulation XX – Regional Clean Air Incentives Market (RECLAIM), November 9, 2001.

GROUP 4

Fugitive Dust Sources

FURTHER EMISSION REDUCTIONS FROM FUGITIVE DUST SOURCES [PM10]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	FUGITIVE DUST SOURCES
CONTROL METHODS:	WATERING, CHEMICAL STABILIZATION, PAVING, REVEGETATION, TRACK-OUT CONTROL, CONSTRUCTION PROJECT SIGNAGE
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Common sources of fugitive dust include vehicular travel on paved and unpaved roads, construction/demolition and earth-movement activities, disturbed vacant lands, storage piles, and agricultural activities. The two basic physical processes that contribute to fugitive dust generation include: pulverization and abrasion of soils through mechanical force (e.g., wheels, blades, etc.), and entrainment of disturbed soils through turbulent air currents (e.g., high winds and vehicular wake effects). Fugitive dust and corresponding PM10 emissions can vary significantly depending on soil type/moisture content, the level/type of activity, and wind conditions (U.S. EPA, 1995).

Regulatory History

Based on CAA requirements and available guidance (U.S. EPA, 1992), the District adopted Best Available Control Measure (BACM) requirements for fugitive dust sources in 1997. These requirements are contained in District Rules 403 (Fugitive Dust) and 1186 (PM10 Emissions from Paved and Unpaved Roads, and Livestock Operations). District Rule 403 is intended to reduce PM10 emissions from any transportation, handling, construction, or storage activity that has the potential to generate fugitive dust. Under Rule 403, fugitive dust sources are required to implement BACM for all sources and all forms of visible particulate matter are prohibited from crossing any property line. District Rule 1186 contains requirements for clean-up of material deposited on to paved roads, use of certified street sweeping equipment, and treatment of high-use unpaved roads.

PROPOSED METHOD OF CONTROL

The District's BACM fugitive dust regulations are at least as stringent as control measures included in any other PM10 non-attainment plan or achieved in practice at the time of adoption in 1997. Subsequently, other PM10 non-attainment areas have developed and adopted fugitive dust regulations

based on special federal requirements (e.g., Most Stringent Measures or MSM) or in response to lawsuits. Elements of these new regulations contain requirements that may improve the effectiveness of the District's fugitive dust control program. A review of existing District BACM regulations is proposed to consider enhancements that would further reduce PM10 emissions from fugitive dust sources. Based on a preliminary review of other air district's recently adopted rules, potential District rule enhancements may include:

- Improved compliance test methods,
- Specific short- and long-term soil stabilization requirements,
- Work practices for specific activities,
- Construction project signage, and
- Mandatory use of track-out control devices (i.e., site ingress/egress improvements).

Additionally, the BACM review will consider regulations for specific geographic areas based on soil type, wind conditions, and source extent. As this control measure may address fugitive dust sources in localized areas, it is also intended as a means to ensure compliance in those areas that are subject to high levels of PM10.

EMISSIONS REDUCTION

All of the control options discussed are existing technologies that are presently available. For more traditional air pollution sources, such as point sources, emissions reductions are calculated by multiplying the baseline emissions by the effectiveness of a given control technology (e.g., selective catalytic reduction). For non-traditional air pollution sources, such as fugitive dust, emissions reductions calculations are more difficult because the level of control necessary to comply will vary greatly due to site-specific conditions. For example, a construction site in a coastal zone with high soil moisture content may have a lower potential to generate fugitive dust emissions compared to a site located in the more arid, inland portions of the Basin. Moreover, many of the proposed rule requirements allow various control options. Accordingly, it is not possible to quantify precise emissions reductions from implementation of this control measure. Requiring the most stringent control option could, however, result in a reduction in source emissions, depending on existing District Rule control options. Until rule development clarifies the effectiveness of the most stringent control options beyond existing AQMD rule requirements, the 2003 AQMP does not take emission reduction credit for CM# BCM-07.

RULE COMPLIANCE

Compliance with this control measure could be achieved through periodic site visits, response to public complaints, and agency reports.

TEST METHODS

Methods to measure PM10 emissions will follow U.S. EPA or approved District guidelines or test methods. Alternate guidelines may be used, provided the measures are first approved by the U.S. EPA and the District.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not been determined. The District will continue to analyze the potential cost impacts associated with implementing this control measure and will provide cost effectiveness information, as it becomes available.

IMPLEMENTING AGENCY

The AQMD has the authority to adopt and enforce rules and regulations to achieve and maintain the National Ambient Air Quality Standards under Health and Safety Code Section 40460 and 40440(a).

REFERENCES

U.S. EPA, Compilation of Emission Factors (AP-42), Chapter 13 - Miscellaneous Sources, January 1995.

U.S. EPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, September 1992 (EPA-450/2-92-004).

FURTHER EMISSION REDUCTIONS FROM AGGREGATE AND CEMENT MANUFACTURING OPERATIONS [PM10]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	AGGREGATE OPERATIONS		
CONTROL METHODS:	AREA SOURCE PRESCRIPTIVE MEASURES FOR AGGREGATE OPERATIONS		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1997**	**2006**	**2010**
PM10 INVENTORY	1.4	1.6	1.7
PM10 REDUCTION		0.6	0.7
PM10 REMAINING		1.0	1.0
CONTROL COST:	UP TO $2,500 PER TON OF PM10		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

Based on year 2000 SCAQMD Annual Emission Reporting data, there are 81 facilities in the District involved in aggregate operations. Aggregate plants produce sand and gravel and crushed stone. Sand and gravel consists of unconsolidated mixture of fine and/or course aggregate material found in natural deposits. Crushed stone can be comprised of limestone, granite, traprock, or any other hard rock produced by blasting and crushing. The aggregate industry is heavily dependent on the construction industry for sales. Major customers include hot mix asphalt concrete plants, ready-mixed concrete and block plants, and heavy construction and paving contractors. Approximately half of the demand is generated by building construction such as housing, commercial building and manufacturing plants with the remainder used at public works projects such as highways, bridges, airports, and water-related projects (CARB, 1993).

Particulate matter may be generated from a variety of locations in the form of fugitive dust. Typical release points from aggregate facilities include:

- Overburden and sand and gravel removal
- Wind-blown dust from storage piles and disturbed surfaces
- Unpaved haul road traffic
- Open conveyors exposed to the wind
- Transfer points in conveyor systems

- Material dumping from trucks, front-end loaders, and conveyors
- Track-out of material from haul roads onto paved roads within the facility and paved public roads serving the facility

In addition, cement manufacturing plants are facilities which quarry, crush, transport, blend, and grind the materials used to manufacture cement. Typically, the raw materials consist of limestone, silica, iron, and alumina. The processing of the raw materials involves a cement kiln where the blended raw materials are heated at high temperatures (i.e., 2700 degrees Fahrenheit) to produce cooked pieces of calcium silicates known as clinker. The clinker is then ground with gypsum into a fine, powdered cement. Particulate emissions occur from points where materials are handled or transferred from one place to another in the cement kiln process. In addition, fugitive dust occurs from quarrying, crushing, and grinding operations, as well as from similar sources found at aggregate operations (e.g., wind-blown dust from storage piles and disturbed surfaces and unpaved haul road traffic).

Regulatory History

At present, the District does not have a source-specific rule directed at aggregate operations. The emissions from these operations are currently regulated under District Rules 404 and 405 (for permitted equipment) and Rules 401, 402, and 403 (for fugitive sources).

Rules 404 and 405 regulate particulate emissions from control exhausts based on concentration (volume discharged) and weight criteria, respectively. Rule 401 controls visible emissions of any air contaminant discharged into the atmosphere from any single source. Rule 402 limits the discharge from any source causing a public nuisance. Rule 403 is a prohibitory rule directed toward any transportation, handling, construction, or storage activity that has the potential to generate fugitive dust. Under Rule 403, all forms of visible particulate matter are prohibited from crossing the property line.

Rule 1112.1 – Emissions of Particulate Matter from Cement Kilns specifies emission limits for particulate matter from the operation of cement kilns. The current emission limits for particulate matter are 0.4 pounds per ton of kiln feed for feed rates less than 75 tons per hour and 30 pounds per ton of kiln feed for feed rates greater than or equal to 75 tons per hour. Emissions from cement kilns are exempt from the requirements of Rules 404 and 405. Fugitive emissions from any material handling, transportation, or storage operations at cement manufacturing plants are subject to Rule 403.

PROPOSED METHOD OF CONTROL

Although visible PM emissions from these sources are potentially addressed through existing general District regulations (e.g., Rule 403), there is not a source-specific rule to reduce emissions from non-permitted (area) sources associated with aggregate operations and cement plants. Existing applicable district regulations are prohibitory in nature (i.e., visible emissions crossing any property line). While Rule 403 can be used to control sources resulting in visible emissions, an additional regulation is necessary to address fugitive dust sources where emissions are constant but not subject to this regulation. Additional controls may also be necessary for sources at aggregate and cement manufacturing plant operations subject to Rules 404, 405, and 1112.1. The proposed control

measure would establish prescriptive measures to control fugitive dust from area sources within aggregate facilities and cement plants as well as evaluate whether additional controls are necessary for the control of PM10 for sources at aggregate and cement manufacturing plant operations subject to Rules 404, 405, and 1112.1. Examples of fugitive dust control requirements include:

- Pre-application of water prior to material extraction
- Application of chemical dust suppressants or establishment of a vegetative ground cover to inactive disturbed areas
- Chemical treatment or paving of internal haul roads
- Covering of material conveyors and haul vehicles
- Use of enclosures or hooding material at transfer points and screen operations
- Installation of wheel washing system(s) where haul vehicles exit the site

The proposed control method for particulate matter from cement kilns would occur in two steps. Step I would require the District to further refine the emission inventory and current level of control from cement kilns. Step II would consist of an evaluation and implementation of the possible controls to further reduce the emissions from cement kilns from their present levels. Types of control methods to further reduce the particulate emissions from cement kilns may include electrostatic precipitators, high efficient baghouses, and improved maintenance practices. Implementation of this control measure may be conducted in two or more separate rulemaking phases.

EMISSIONS REDUCTION

The estimated emission inventory and emission reductions for fugitive dust emissions from aggregate operations are summarized in the Control Measure Summary Table. The estimated emission inventory from cement kiln operations at cement manufacturing plants are not determined and will be determined upon completion of Step I of the proposed control method. The estimated emission reductions from cement kiln operations will be dependent on the control strategies and are not determined. Based on preliminary modeling analysis, a 50 % reduction in emissions from cement manufacturing operation will significantly reduce the PM10 levels in downwind areas.

RULE COMPLIANCE

Compliance with this control measure could be achieved through periodic site visits and in response to public complaints.

TEST METHODS

Methods to measure PM10 emissions shall follow U.S. EPA or approved District guidelines or test methods. Alternate guidelines may be used, provided the measures are first approved by the U.S. EPA and the District.

COST EFFECTIVENESS

The cost-effectiveness of this control measure has not been determined. The District will continue to analyze the potential cost impacts associated with implementing this control measure in conjunction with emissions inventory update and will provide cost effectiveness information as it becomes available. Based on previous estimates, the cost-effectiveness of several potential control options has been reported as follows:

- Unpaved road treatments - $958 per ton PM10 reduced (SCAQMD, 1997)
- Stabilization of inactive disturbed lands - $810 per ton PM10 reduced (SCAQMD, 1990)
- Revegetation of inactive disturbed lands - $532 per ton PM10 reduced (SCAQMD, 1990)
- Material transport controls (e.g., truck covers, freeboard requirements, material damping, clean up of spills) $2,500 per ton PM10 reduced (MAG, 2000)

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from aggregate operations and cement manufacturing plants.

REFERENCES

California Air Resources Board (CARB), Compliance Division, Aggregate Plants, Compliance Assistance Program, 1993.

California Air Resources Board (CARB), Compliance Division, Cement Kiln, Compliance Assistance Program, 1996.

Maricopa Association of Governments (MAG), Revised MAG 1999 Serious Area Particulate Plan for the Maricopa County Nonattainment Area, February 2000.

South Coast Air Quality Management District (SCAQMD), Revised Final Staff Report for Proposed Amended Rule 403 (Fugitive Dust) and Proposed Rule 1186 (PM10 Emissions from Paved and Unpaved Roads, Livestock Operations), February 1997.

South Coast Air Quality Management District, Final 2002 Coachella Valley PM10 State Implementation Plan, 2002.

GROUP 5

Miscellaneous Sources

PROMOTION OF LIGHTER COLOR ROOFING AND ROAD MATERIALS PROGRAMS [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ROOFING, PAVING, AND BUILDING MATERIALS AND TREE PLANTING PROJECTS
CONTROL METHODS:	USE OF MORE REFLECTIVE AND LIGHTER COLOR SURFACES ON EXTERIOR SURFACES LOCATED IN URBAN AREAS
EMISSIONS:	IMPLEMENTATION OF THIS CONTROL MEASURE IS EXPECTED TO LOWER AMBIENT TEMPERATURES IN URBAN AREAS. LOWER AMBIENT TEMPERATURES WOULD DECREASE THE FORMATION OF OZONE, WHICH IN TURN IS EXPECTED TO RESULT IN IMPROVED AIR QUALITY.
CONTROL COST:	NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD, CEC, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to encourage activities that would lower ambient temperatures in urban areas. This control measure focuses on encouraging activities such as using lighter, more reflective surface materials and increased tree planting.

Background

Over the past four decades, summer temperatures in urban cities throughout the nation have increased by 2 to 4°F. Since 1940, it is estimated that peak temperatures in Los Angeles have increased approximately 5 to 6°F (Akbari, et al, 1990; EPA, 1990). The increased temperatures are primarily occurring in urban areas. Moreover, studies have shown that summer temperatures in urban areas are typically 2°F to 8°F higher than in their rural surroundings. (EPA, 1992).

The difference between urban and rural temperatures is referred to as the "urban heat island effect." The replacement of natural vegetation such as trees, grass, and soil with concrete and asphalt reduces the landscape's ability to lower daytime temperatures and loses the benefits of shade. In addition, the use of dark colored materials and surfaces that absorb, rather than reflect incoming solar energy adds to the effect, thus increasing temperatures in cities and urban areas.

The urban heat island effect has adverse impacts on air quality and energy demands. The increased solar gain absorbed by the city can increase energy demands for cooling and accelerate ozone formation. Studies indicate that in large metropolitan cities such as Los Angeles, utility peak loads will increase 1.5 to 2 percent for every 1°F increase in temperature. In Los Angeles, energy loads for both

Los Angeles Department of Water and Power (LADWP) and Southern California Edison (SCE) increase by about 2 percent per °F with respect to the base load (Taha, et al, 1992).

The ability of a surface to reflect is referred to as albedo and is measured from zero to one, with one representing the most reflective and zero representing the most absorbent. Most buildings and cities have albedos between .20 and .35 (Akbari, et al, 1990). To reduce urban temperatures, albedos can be increased by using lighter, more reflective materials on surfaces of roofs and pavement (roads and parking lots). In addition to providing shade to buildings and surfaces, trees cool the air directly by evapotranspiration and block solar radiation and prevent these structures and surfaces from heating up beyond the ambient temperature (LADWP, 1992). Moreover through evapotranspiration, the natural releasing of water vapor from leaves and trees cools the environment, thus bringing down the temperature of the entire area.

A preliminary air quality modeling analysis indicates cooler surfaces and tree planting can improve the ozone air quality in Los Angeles. Initial results indicate that through cooler surfaces for homes, office-building roofs, and paved surfaces, and planting 11 million trees in Los Angeles, that the heat island effect can be reduced as much as 37°F (Rosenfeld, et al, 1996). This could potentially reduce ozone exceedances by 12 percent, relative to the state ozone standard.

In May 2002, the District co-funded a project with the City of L.A., L.A. Department of Water and Power, Lawerence Berkeley Laboratories and the California Energy Commission to assess the effects of using lighter colored roofing materials to improve energy efficiency and to lessen the urban heat island effect. A field study was conducted to measure the changes in surface temperatures in light colored roofing and paving materials installed in and around the L.A. Zoo. Results of the project are still pending.

Regulatory History

In January 1992, the EPA introduced a publication, Cooling Our Communities: A Guidebook on Tree Planting and Light-Colored Surfacing. This guidebook discussed the causes, magnitude and impacts of increased urban heat islands.

There are communities within the Basin which have tree planting programs and ordinances already in effect. In addition, some utilities provide educational guidance brochures regarding tree planting.

PROPOSED METHOD OF CONTROL

This control measure proposes to develop a program to promote the use of light colored roofing and pavement and increased tree planting. Programs to promote use of more reflective pavement and tree planting could be a required element for new sources, or could be included as recommendations through the District's California Environmental Quality Act (CEQA) Air Quality Handbook. Sources such as builders, utilities, private citizens, etc. that promote the use of lighter colored materials and increased tree planting could be eligible for an emission credit. Emission credits could be issued based on types of surface materials used or numbers of trees per unit or area that meet or exceed a specified benchmark.

There are a variety of techniques that can be implemented to reduce urban temperatures and increase the albedo of roofs, pavements, and building surfaces. Most of these techniques can be implemented during the maintenance or modification of existing structures or during the building stages of new structures.

Roofing Materials

The reflectivity of roofs is measured in terms of roof temperature at noon on a clear summer day, with an air temperature of 90°F, averaged over the warranted life of the roof. A gray roof with a smooth or washable texture would have a roof temperature under the aforementioned conditions of approximately 160°F. A light green roof has a higher albedo, and accordingly a lower surface temperature of 135°F.

One method of achieving higher albedos is to coat existing surfaces or modify the makeup of new surfaces so that they incorporate lighter colored materials. Available techniques for roof whitening include, but are not limited to the following (Taha, et al, 1992):

- adding light-colored aggregate to the roofing material;
- light-colored rocks on flat or gently-sloped roofs;
- colored or painted roofs;
- coating with elastomeric coatings and single plies; and
- using light-colored concrete tiles on sloping roofs.

Pavement and Building Surface Materials

Within the city, there are a number of urban surfaces such as streets, sidewalks, parking lots, school yards, and other similar surfaces, that have dark surfaces. The following identifies techniques that can be implemented to lighten urban surfaces (Taha, et al, 1992, Pomerantz, 1996):

- using light-colored aggregates in the upper layer of the asphalt in new pavements;
- using a light-colored slurry or chip seal when resurfacing;
- using concrete rather than asphalt, with a light-colored aggregate and binder;
- whitetopping (light-colored concrete pavements);
- using artificial lighteners in preparing the mixtures of asphaltic concrete and slurry seals; and
- using paints of light colors that are designed specifically to resist weathering, wear and tear, and other environmental effects.

In addition to selecting materials with high albedos, other considerations are important to ensure that materials maintain their original albedos. Considerations that should be taken into account include, but

are not limited to material wear resistance, effects of soiling, and surface texture. In addition, in selecting materials for roads, parking lots, and driveways, it is important that the light-colored surface has a non-skid finish.

Tree Planting

To help lower an entire city's temperatures through evapotranspiration, street trees need to be planted in public as well as private spaces such as parking lots, plazas, street meridians, sidewalks, residential yards, corporate lawns, parks, and shopping plazas (EPA, 1992). For homes and buildings, the most dramatic cooling takes place when trees directly shade windows, walls, roofs, and air-conditioning units (LADWP, 1992). For residences, most experts suggest planting three or more trees, placing them so they will shade the home and outdoor living areas during the summer months (SCE, 1991). The air conditioning savings are even greater when the tree shades an office building with large windows and long air conditioning hours.

A general rule of thumb is to plant at least five to ten feet from a structure; moreover, the shape and projected mature spread of the tree should be taken into account in this distance (LADWP, 1991). To maximize the evaportranspiration of tree planting programs, the placement of trees in cities is important. The following identifies tree planting strategies that should be considered to maximize the cooling benefits associated with increased tree planting:

- shade east- and west facing walls and windows of home or building to reduce air conditioning energy consumption,
- shade roofs to lower the temperature of interiors of homes and buildings, external surfaces, and surrounding environment,
- shade outdoor air conditioning units to increase its efficiency,
- shade nearby walls and flat surfaces such as walkways, driveways, alleys, and the streets, and
- plant trees to influence wind movement and circulation around and through residences and buildings.

In selecting shade trees for large-scale planting, they must be low biogenic emitters (Benjamin & Winer, 1994). Consideration should also be taken for their tolerance to air pollution, water requirements, effect (or lack of effect) on sidewalks, sewer lines and overhead electric lines, and insect and pest resistance (Corchnoy, et al, 1991). The shape, size, species, as well as fire hazards are important to consider in selecting shade trees. In selecting species, it is important that trees with the potential to produce biogenic hydrocarbon emissions be avoided. The District would work with interested parties to develop a list of species of trees that would be recommended for shading.

EMISSIONS REDUCTION

Implementation of this control measure is expected to decrease ambient temperatures in the Basin, particularly during summer months. Improved air quality is expected as a result of lower urban temperatures.

RULE COMPLIANCE

Implementation of this measure could be based on the following:

- local government model ordinances;
- legislative strategies for incentives; and
- public outreach for consumer awareness.

In addition, the District may consider the development of an emissions credit mechanism to provide emission credits based on the number of units modified or installed that use materials and colors meeting or exceeding a specified benchmark.

TEST METHODS

ASTM Sub-Committee E06-21 has developed E1980-01 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opague Surfaces to determine indexes and surface temperatures for surfaces with emissivity greater than 0.1.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been fully determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

Implementation of this measure is expected to require the partnership of the District, CEC, and local government.

REFERENCES

Rosenfeld et. al. "Policies to Reduce Heat Islands: Magnitudes of Benefits and Incentives to Achieve Them," EE-1, U.S. Department of Energy, Washington, D.C. MS 90-2000, Lawrence Berkeley National Laboratory, Berkeley, California. 1996.

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Taha, H., D. Sailor, and H. Akbari. "High-Albedo Materials for Reducing Building Cooling Energy Use." Heat Island Project Energy and Environment Division Lawrence Berkeley Laboratory. January 1992.

Los Angeles Department of Water and Power. "Smart Planting for the New Urban Forest. A Guide to Planting Trees Around Your Home." 1992.

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Corchnoy, B. Stephanie, Janet Arey, Roger Atkinson. "Hydrocarbon Emissions from Twelve Urban Shade Trees of the Los Angeles, California, Air Basin." November 1991.

PROMOTION OF CATALYST-SURFACE COATING TECHNOLOGY PROGRAMS
[O_3, CO]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	RESIDENTIAL AND STATIONARY AIR CONDITIONING UNITS
CONTROL METHODS:	INCORPORATE CATALYST-SURFACE COATING TECHNOLOGIES IN AIR CONDITIONING UNITS
EMISSIONS:	IMPLEMENTATION OF THIS CONTROL MEASURE IS EXPECTED TO RESULT IN THE CONVERSION OF AMBIENT OZONE AND CARBON MONOXIDE INTO OXYGEN AND CARBON DIOXIDE, RESPECTIVELY.
CONTROL COST:	NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to encourage the incorporation of catalyst-surface coating technologies in residential and commercial air conditioning units, in order to promote the conversion of ground-level ozone and carbon monoxide into oxygen and carbon dioxide. To maximize air quality benefits, this control measure would be primarily implemented in those areas within the South Coast Air Basin that experience the highest ambient ozone levels.

Background

Catalysts can be coated on surfaces that come into contact with large volumes of ambient air, to promote the chemical conversion of ozone and carbon monoxide (CO) into harmless gases. Applicable surfaces with regard to stationary source applications include residential and commercial air conditioning units, utilizing the existing condenser surface area or perhaps adding a catalyzed filter across the exhaust air stream. These coatings could also be potentially applied to heating and ventilation equipment as well.

To date, the preponderance of work evaluating the effectiveness of catalyst-surface coating technology has been performed by Engelhard Corporation. Their work has focused on the use of this technology on motor vehicle radiator surfaces, due to the large amount of ambient air flow across this surface type, but they also consider their technology applicable to air handling equipment used in residential and commercial applications (Engelhard, 2002).

In cooperation with Engelhard Corporation, the District conducted a study in 1997 to determine the effectiveness of catalytic coating applied to residential air conditioner condensers for the removal of atmospheric ozone. Sampling was conducted on some test sites and showed that there was a distinct reduction in ozone from the use of air conditioner condensers treated with the catalyst. However, the

findings did not conclude what effect, if any, the catalysts would have on lowering ambient ozone concentrations (SCAQMD, 1998)

Regulatory History

There is currently no regulatory history with regard to the use of catalyst-surface coating technology for the direct reduction of ground level ozone and CO emissions. To date, the regulatory and analytical framework for addressing ozone reductions has historically been based on directly reducing emissions of VOC and NO_x (ozone precursors).

PROPOSED METHOD OF CONTROL

This control measure proposes to develop a program to promote the use of catalyst-surface coating technologies in residential and commercial air conditioning units. The program would specifically focus on those areas in the South Coast Air Basin that exhibit the highest ozone levels in order to maximize the emission reduction potential of this control strategy. The use of catalyst-surface coating technology could be a required element for new sources, or could be included as a recommendation through the SCAQMD's California Environmental Quality Act (CEQA) Air Quality Handbook. The issuance of emission reduction credits could also be used to promote the implementation of this technology.

Prior to implementing programs that promote the use of catalyst-surface coating technology, analyses would have to be performed to better understand the design parameters, air quality benefits, and cost impacts associated with utilizing this technology in stationary air conditioning applications. This work would serve to augment evaluations already completed for motor vehicle applications.

EMISSIONS REDUCTION

Implementation of this control measure is expected to decrease ambient ozone and carbon monoxide emission levels in the Basin, particularly during summer months.

RULE COMPLIANCE

Implementation of this measure could be based on the following:

- local government model ordinances;
- legislative strategies for incentives; and
- public outreach for consumer awareness.

In addition, the SCAQMD may consider the development of an emissions credit mechanism to provide emission credits based on the number of air conditioning units that are modified or installed that use catalyst-surface coating technology.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been fully determined.

IMPLEMENTING AGENCY

Implementation of this measure is expected to require the partnership of the SCAQMD and local government agencies.

REFERENCES

Johnson, David, E3 Ventures. Written communications with Mike Nazemi. November to December, 1995.

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Sierra Research. "An Evaluation of On-Road Ozone Destruction Using a Catalyst-Coated Automobile Radiator." Report No. SR95-03-06, prepared for Engelhard Corporation, March 30, 1995.

Engelhard. "PremAir Catalyst Overview – Using Air Handling Equipment to Destroy Ozone." Engelhard.com. (2002)

SCAQMD. "Report on Ozone Sampling for Effectiveness of the Engelhard Catalyst on Residential Air Conditioning Condensers." January, 1998.

EMISSION REDUCTIONS FROM MISCELLANEOUS AMMONIA SOURCES
[NH_3]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	MISCELLANEOUS AMMONIA SOURCES
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

In 1998, the District initiated a revision to the 1995 PM10 Technical Enhancement Program in order to enhance efforts in the areas of monitoring, emissions inventory, and air quality modeling. Based on the 2000 revision to the Technical Enhancement Program (TEP) and the update to the ammonia inventory, there are sources of ammonia that, when combined with gaseous nitric and sulfuric acid resulting from upwind NO_x and SO_x emissions, could result in increases in particulate aerosol ammonium nitrate and sulfate in peak PM2.5 and PM10 areas.

To expeditiously attain the PM10 standard and make progress toward the PM2.5 standard, further reductions of ammonia emissions are necessary. This control measure identifies additional sources and potential control methods that may warrant additional development. The purpose of this measure is to develop a comprehensive ammonia control plan through more refined source characterization and control assessment.

The 1997 Gridded Ammonia Emission Inventory Update (SCAQMD, 2000) quantifies emissions from all ammonia sources in the Basin. The emissions inventory study estimated that these sources contribute between 154 to 180 tons per day of ammonia emissions. The ammonia emissions from on-road mobile sources were estimated at 33 tons per day or 18% of the overall ammonia inventory, while these emissions were estimated to be 7 tons per day or roughly 5% of the overall ammonia inventory in the 1997 AQMP. The basis for the 1997 Gridded Ammonia Emission Inventory Update was tunnel studies for on-road motor vehicles which resulted in higher emission factors (three and a half times larger) than the average used to estimate the emissions in the 1997 AQMP (SCAQMD, 2000).

The majority of ammonia sources identified are non-traditional sources such as soil surfaces (39 tons per day) and domestic sources (23 tons per day) such as dogs, cats, cigarette smoke, human perspiration and waste, and household ammonia products. Other sources of ammonia emissions include landfills, sewage treatment plants, and small industrial plants. Locally concentrated sources already identified in other control measures or currently undergoing rule development include livestock operations (59 tons per day) and composting operations (5 tons per day). Currently dairy emissions,

representing between 19 and 25 tons of ammonia per day are being addressed in Proposed Rule 1127-Emission Reductions From Livestock Waste. Composting operations are being addressed in Proposed Rule 1133.2 – Emission Reductions From Co-Composting Operations.

Regulatory History

Proposed Rule 1133.2 (partially implementing Control Measure CM #99 WST-02) includes specific control requirements to reduce ammonia and VOC emissions from co-composting operations. Proposed Rule 1127 (implementing Control Measure CM #99 WST-01) proposes to achieve ammonia and VOC emission reductions from livestock waste, specifically dairy manure.

PROPOSED METHOD OF CONTROL

Based on a preliminary review of the TEP 2000 and the 1997 Gridded Ammonia Emission Inventory Update, potential inventory assessments and control strategies for ammonia sources may include, but are not limited to:

- Better quantification of mobile source ammonia emissions
- Identification of control device maintenance procedures, warnings, and/or devices to reduce mobile source ammonia emissions
- Extend Proposed Rule 1127 to poultry and other livestock operations
- Expand Proposed Rule 1133 series to other composting operations
- Investigate fertilizer formulation and application procedures that may reduce nitrogen loss to air (e.g., ammonia emissions)
- Review refrigeration and metal treating technologies to access potential control options, if necessary

The evaluation of control strategies will be conducted in conjunction with modeling to ensure the effectiveness of the proposed control methods.

EMISSIONS REDUCTION

Projected emission reductions are uncertain at this time, and require further analysis.

RULE COMPLIANCE

Compliance with this control measure would depend on the type of controls implemented.

TEST METHODS

Source testing methods will be determined on a case-by-case basis for various sources. Laboratory methods to be used include EPA Method 17/350.2 for free ammonia.

COST EFFECTIVENESS

The cost-effectiveness of this control measure has not been determined. The District will continue to analyze the potential cost impacts associated with implementing this control measure.

IMPLEMENTING AGENCY

The District has the authority to regulate ammonia emissions from stationary sources. Depending on the sources identified for additional control, the District will work with other agencies such as county sanitation districts and other state (e.g., CARB) and local agencies to implement this control measure.

REFERENCES

South Coast Air Quality Management District (SCAQMD), Technical Enhancement Program For the 2000 AQMP Revision (TEP 2000) Work plan, February 1998.

South Coast Air Quality Management District (SCAQMD), Final 1997 Gridded Ammonia Emission Inventory Update For the South Coast Air Basin, August, 2000.

EMISSION REDUCTIONS FROM RESTAURANT OPERATIONS

[PM10]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	RESTAURANT OPERATIONS		
CONTROL METHODS:	EXHAUST CONTROL TECHNOLOGY; ADD-ON CONTROLS; GRILL DESIGN CHANGES		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1997**	**2006**	**2010**
PM10 INVENTORY	10.7	10.4	10.6
PM10 REDUCTION		0.2	1.0
PM10 REMAINING		10.2	9.6
CONTROL COST:	NOT DETERMINED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Information presented in this control measure for restaurant operations (e.g., emissions inventory, control efficiency, and cost-effectiveness) represents the current understanding of the source category. During the rule development process, the District will continue to collect and assess information, as it becomes available. Information collected during the rule development process will be appropriately reflected in the rule applicability and requirements.

Background

Restaurants employ a number of cooking devices, such as charbroilers, deep fat fryers, griddles, ovens, and rotisseries which emit VOC and/or PM10. Griddles account for approximately five percent of the total PM10 restaurant emissions inventory and four percent of the total VOC emissions. Emissions from deep-fat fryers are negligible for PM10 and are only two percent of the VOC emission inventory. Oven emissions appear to be negligible. Thus, this control measure covers restaurant facilities which use charbroilers; the equipment responsible for 85 percent of the emissions from the restaurant operations source category. Approximately 37 percent of the estimated 29,000 restaurants in the Basin use charbroilers. Testing has shown that the majority of PM10 emissions from charbroilers are measured at 2.5 microns and below.

Charbroiling operations are the most common method of direct meat-firing by "quick service" and full-service restaurants. The charbroiler can be located either against the wall where the exhaust flows to a wall-mounted hood, or in the middle of the kitchen where the exhaust flows to an island-type hood. Depending on the number of hoods and the ventilation configuration, other equipment such as deep fat-fryers and griddles may be vented to the same hood.

Charbroiling consists of three main components: a heating source, a high-temperature radiant surface, and a grill. The grill, which is grated, holds the meat while exposing it to the radiant heat. When grease (fat) and meat additives such as tenderizers fall from the cooking meat onto the high-temperature radiant surface, both VOC and PM10 emissions are generated. The decomposition of fat and food additives releases various gaseous organics including aldehydes, organic acids, alcohol, and nitrogen and sulfur compounds. Particulate emissions result from the fat being entrained when dripping grease flares up.

Charbroilers are further distinguished as either chain-driven or under-fired. A chain-driven is a semi-enclosed device with a mechanical chain, which automatically moves the food through the device. Under-fired means the heat source is located below the food. Restaurants chiefly operate flame-fired broilers during the dinner hours of 6 PM to 8 PM. However, many "quick service" food establishments have direct-flame broilers with peak operations from 11 AM to 2 PM and from 5 PM to 7 PM. Under-fired charbroilers are responsible for the majority of emissions from the restaurant operations source category (84 percent of PM10 emissions, and 71 percent of VOC emissions).

Regulatory History

Rule 219 – Equipment not Requiring a Written Permit Pursuant to Regulation II, was amended September 11, 1998 to specifically exempt the following equipment from written permit requirements of Rules 201 – Permit to Construct and Rule 203 – Permit to Operate:

> "Equipment used in eating establishments for the purpose of preparing food for human consumption, including commercial charbroilers and associated control equipment subject to Rule 222."

Rule 222 – Filing Requirements for Specific Emission Sources not Requiring a Written Permit Pursuant to Regulation II, is a permit streamlining rule which requires sources subject to its provisions, to obtain a filing rather than a permit from the District. Sources operating by a filing and not a permit are not required to install Best Available Control Technology (BACT). Deep-fat fryers and griddles, due to their negligible emissions, are also exempt from permit and they are additionally exempted from filing requirements. These equipment may, however, share a hood which is venting a charbroiler and if control equipment were installed in the hood, the emissions from all commonly vented equipment would be reduced.

Charbroilers, although exempted from permit and thus BACT, must comply with Rules 401 – Visible Emissions and 402 – Nuisance. In September 1998, Rule 401 was amended to allow commercial charbroilers to comply with the state standard of Ringleman 2 (40 percent) opacity reading for a period not to exceed three years (September 2001), instead of the more stringent Ringleman 1 (20 percent) standard applied to most equipment operating control technology for under-fired charbroilers.

Commercial restaurant establishments must also comply with state requirements which usually follow the standards set forth by the Building Officials, and Code Administration's Basic Mechanical Code and the National Fire Protection Agency's National Fire Codes, as well as Health Department standards. These codes require restaurant facilities to operate and maintain sufficient grease removal

devices and exhaust and ventilation systems. Such devices reduce grease particulate emissions but are not considered air pollution controls by the District.

On November 14, 1997, the District adopted Rule 1138 – Control of Emissions from Restaurant Operations. Specifically, this rule applies to commercial cooking operations using chain-driven charbroilers. Sources had until November 4, 1999, to install a flameless catalytic oxidizer control device and reduce PM10 and VOC emissions by approximately 83 percent. The rule, at full implementation, was estimated to reduce emissions from this portion of the restaurant operations source category by one ton per day of PM10 and 0.3 ton per day of VOC emissions.

The control measure for restaurant operations in the 1999 Amendment to the 1997 Ozone State Implementation Plan for the South Coast Air Basin includes both VOC and PM10 whereas this control measure in the 2003 AQMP targets PM10 only. The 1999 Amendments to the 1997 Ozone State Implementation Plan allow substitution of emission reductions when another rule results in more emission reductions than planned. Due to the high costs associated with reducing VOC emissions from under-fired charbroilers, the commitment for VOC emission reductions from restaurant operations has been met through a substitution of excess reductions achieved through implementation of other control measures. In August 2000, the Governing Board directed staff to substitute VOC emissions reductions from another control measure that achieves emission reductions in excess of the AQMP projected reductions. While a control technology may produce reductions in both VOC and PM10 emissions, this control measure focuses on PM10 reductions.

PROPOSED METHOD OF CONTROL

The University of California, College of Engineering, Center for Environmental Research and Technology (CE-CERT), under contract with the AQMD is conducting a control technology assessment, testing possible cost-effective controls for under-fired charbroilers. A Restaurant Advisory Committee formed by CE-CERT, consisting of members representing academia, AQMD, industry and manufacturers, chose several technologies to be investigated.

CE-CERT investigated several potential commercial cooking emission control technology systems, including: microwave ceramic filter, cyclonic air scrubbing device and process design. Criteria for testing included the ability to reduce both PM10 and VOC emissions, cost, commercial availability, maintenance and operational requirements, and safety.

A microwave ceramic filter technology was tested, based on the concept of filtering out the harmful emissions in the ventilation system and periodically regenerating the loaded filters using microwave energy. This process, revised due to poor overall performance after several initial tests, was tested again and still performed poorly. Also tested was a cyclonic air scrubbing device, which employs water and filters to remove PM10 and carbon beds to remove the VOC. Initial testing shows an 88 percent reduction in PM10 emissions and a 44 percent reduction in VOC emissions. An alternative to these and other prototype control technologies is the replacement of under-fired charbroilers with a Smokless™ broiler. The Smokless™ broiler is commercially available and is in use by approximately seventy restaurants in the United States. The SmoklessTM broiler is not a control device but rather

basic equipment similar to an under-fired charbroiler. However, the Smokless™ broiler is not a direct-flame cooker and it may result in a product that differs in appearance and/or taste. The Smokless™ broiler is estimated to result in a 75 percent reduction in PM10 emissions and a 71 percent reduction in VOC emissions.

EMISSION REDUCTIONS

The projected emission inventories and emission reductions are provided in the Control Measure Summary. The 2010 emission inventory is estimated to be 10.6 tons of PM10 per day. The emission reduction target for Control Measure #2003PRC-03 is approximately 1 ton of PM10 per day reduction from this baseline. The 1999 Amendment to the 1997 Ozone SIP estimated that this control measure would achieve 7 tons per day. However, based on the limited availability of control options and the inherent costs associated with the probable control technologies, the expected emission reductions were reassessed and are now set at a target of 1 ton per day. Future rulemaking would seek to achieve the maximum emission reductions possible (i.e., greater penetration), given the available control technology and associated costs. If a control technology is found to be more cost-effective then those currently available, additional emission reductions are possible.

RULE COMPLIANCE

There are currently no available cost-effective controls which could be applied to the entire population of charbroilers in the South Coast Air Basin. However, as cost-effective controls are identified, it seems appropriate that facilities subject to any future rules arising from implementation of this control measure maintain records at the restaurant regarding quantities and types of food cooked, equipment operations and maintenance. Implementation of an outreach program would improve compliance. Maintenance of these records should not be a hardship in light of the fact that restaurants typically track types of food and their volume cooked.

TEST METHODS

In conjunction with the rule development process for Rule 1138 and associated source testing, the document "Protocol – Determination of Particulate and Volatile Organic Compound Emissions from Restaurant Operations" was published November 14, 1997. These test methods are currently being used for testing of charbroilers and potential control devices. The test methods are used by qualified labs to certify the emissions level of specific control systems but are not employed to test emissions at individual restaurants.

COST-EFFECTIVENESS

The cost-effectiveness of this control measure has not been determined. The District will continue to analyze the potential cost impacts associated with implementing this control measure.

IMPLEMENTING AGENCY

The District has authority to regulate PM10 emissions generated from restaurant operations. Implementation of this control measure is anticipated to begin in 2004 with a phase-in approach structured to reduce capital costs of controls with larger restaurants achieving compliance first.

REFERENCES

Final report by Pacific Environmental Services, Inc., A Detailed Survey of Restaurant Operations in South Coast Air Basin; Contract No. 98089, February 1999.

Final report by University of California Riverside, College of Engineering, Center for Environmental Research and Technology, Efficient and Cost-effective Control Technologies for Underfired Charbroilers, Contract No. 98015, February 1999

Final report by University of California Riverside, College of Engineering, Center for Environmental Research and Technology, Further Development of Emissions Test Methods and Development of Emission Factors for Various Commercial Cooking Operations, Contract No. 96027, July 1997.

South Coast Air Quality Management District. Status Report on Controlling Particulate Matter and Volatile Organic Compound Emissions from Restaurant Operations, Agenda No. 20, August 18, 2000.

South Coast Air Quality Management District. Report on Feasibility of Emissions Reductions from Under-Fired Charbroilers, Agenda No. 19, May 14, 1999.

South Coast Air Quality Management District. 1999 Amendments to the 1997 Ozone State Implementation Plan for South Coast Air Basin, December 1999

South Coast Air Quality Management District. Protocol – Determination of Particulate and Volatile Organic Compound Emissions from Restaurant Operations, November 14, 1997

South Coast Air Quality Management District. Staff report for Proposed Rule 1138 – Control of Emissions from Restaurant Operations, October 10, 1997.

Walden Research Corporation. Background Information for Establishment of National Standards of Performance for New Sources – Deep Fat Frying. Prepared for the Office of Air Programs of the U.S. EPA, October 1971.

INDUSTRIAL PROCESS OPERATIONS
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	MISCELLANEOUS INDUSTRIAL PROCESS OPERATIONS
CONTROL METHODS:	STEP I: EMISSION INVENTORY AND TECHNOLOGY ASSESSMENT STEP II: CONTROL STRATEGY DEVELOPMENT AND IMPLEMENTATION (ENHANCED INSPECTION MAINTENANCE AND HOUSEKEEPING WORK PRACTICES, PROCESS MODIFICATIONS, ADD-ON CONTROLS)

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1997**	**2006**	**2010**
VOC INVENTORY	15.8	13.9	15.1
VOC REDUCTION		0.8	1.8
VOC REMAINING		13.1	13.3
SUMMER PLANNING INVENTORY	**1997**	**2006**	**2010**
VOC INVENTORY	18.1	15.4	16.9
VOC REDUCTION		0.9	2.0
VOC REMAINING		14.5	14.9

CONTROL COST:	UP TO $13,500 PER TON OF VOC REDUCED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure proposes to further control VOC emissions from miscellaneous industrial process operations. Control Measure #PRC-07 is based on Control Measure #ADV-PRC, which was part of the 1999 Amendment of the 1997 Ozone SIP Revision for the South Coast Air Basin.

Background

The source categories targeted under this control measure are permitted and unpermitted VOC sources that are involved in manufacturing or fabrication of rubber, plastic, fiberglass, or chemical compounds, as well as those involved in the processing, handling, or storage of VOC containing materials. Emissions are primarily generated from material handling, use of chemicals, blowing agents, manufacturing processes, as well as storage, handling, and processing of resins, or the drying/cooling of finished products. Sources under this control measure would also include bakeries, breweries, and other point and area sources under chemical, food, and agriculture products processing source categories.

Regulatory History

Rubber products and plastic products manufacturing operations include processes that are not currently regulated under a source-specific District rule for the pollutant identified. However, they are subject to Rule 402 which limits the discharge from any source causing a public nuisance, and to Rule 442 which controls the discharge of organic solvents into the atmosphere. Other source categories targeted by this control measure are regulated under other source specific Regulation XI rules.

PROPOSED METHOD OF CONTROL

Since many of the source categories targeted by this measure are not permitted, it is necessary to first identify and refine the emissions inventory and better characterize the sources of emissions, and industry operations and practices. Based on the findings, appropriate control methods can then be developed. Potential control methods could include enhanced inspection and maintenance and other housekeeping work practices to reduce fugitive emissions from material transfer, storage, and processing. Process modification may also provide an effective control option to minimize or eliminate emission sources. Add-on controls may also be considered where feasible and cost-effective. This measure will seek emission reductions from the processes that can potentially be modified, controlled, or converted.

EMISSIONS REDUCTION

The projected VOC emissions and estimated emission reductions are provided in the Control Measure Summary. This control measure was estimated to have a range of reduction potential from 2 to 5 tons per day of VOC. The lower end of the reduction is used in the draft 2003 AQMP, pending further feasibility analysis.

RULE COMPLIANCE

Depending on the control methods proposed, appropriate rule compliance requirements will be developed, which may include, but are not limited to, operator inspection, maintenance, and recordkeeping. It may also be necessary to develop innovative rule implementation programs dealing with numerous non-permitted small sources.

TEST METHODS

Source testing methods will be determined on a case-by-case basis for various sources.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been specifically determined, but is expected to be no more than $13,500 per ton of VOC reduced. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions from industrial processes.

EMISSION REDUCTIONS FROM LIVESTOCK WASTE [VOC, NH_3]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: LIVESTOCK WASTE

CONTROL METHODS: EMISSION REDUCTION CAN OCCUR FROM OUT-OF-BASIN DAIRY COW RELOCATION, THE IMPACT OF WATER QUALITY REGULATIONS, AND OTHER CONTROLS AS NEEDED, SUCH AS MANURE REMOVAL OUT OF THE BASIN OR TO CONTROLLED COMPOSTING FACILITIES OR ANAEROBIC DIGESTERS. OTHER POTENTIAL CONTROL OPTIONS INCLUDE LOW-NITROGEN FEEDS, PROMOTION OF AEROBIC CONDITIONS (E.G., ENZYMATIC AND MICROBIAL PRODUCTS), IMPROVED HOUSEKEEPING PROCEDURES OR OTHER APPROVED METHODS

EMISSIONS (DAIRIES ONLY):

ANNUAL AVERAGE	**1997**	**2006**	**2010**
VOC INVENTORY	12.1	11.0	11.0
VOC REDUCTION		4.2	4.8
VOC REMAINING		6.8	6.2
NH_3 INVENTORY	21.2	19.3	19.3
NH_3 REDUCTION		8.7	8.7
NH_3 REMAINING		10.6	10.6

SUMMER PLANNING INVENTORY	**1997**	**2006**	**2010**
VOC INVENTORY	12.1	11.0	11.0
VOC REDUCTION		4.2	4.8
VOC REMAINING		6.8	6.2

CONTROL COST: NOT AVAILABLE FOR VOCS (REDUCTIONS DUE TO RELOCATION AND IMPACT OF WATER QUALITY REGULATIONS). $2,000 TO $7,000 PER TON OF AMMONIA REDUCED

IMPLEMENTING AGENCY: SCAQMD WITH THE COOPERATION OF WATER AND LOCAL AGENCIES

DESCRIPTION OF SOURCE CATEGORY

Background

Livestock waste emissions are precursors to both ozone and particulate matter (PM10). VOCs contribute to ozone and ammonia is a precursor of secondary PM10 (aerosol particulates). The manure from the dense concentration of dairy operations in the Chino/Ontario area produces the most concentrated source of ammonia emissions in the Basin. Ammonia combines with nitric and sulfuric acid produced from upwind combustion sources (e.g. NO_x and SO_x sources in Los Angeles and Orange counties) to produce aerosol nitrates. High levels of ammonium nitrate and sulfate particulates

are seen at monitoring stations downwind of the Chino/Ontario area; these stations typically record the highest levels of PM10 in the Basin. (Direct emissions of PM10 arise from wind entrainment from corral areas and stockpiles, wind entrainment of materials during feed preparation, and road dust from paved and unpaved roads on the livestock facilities. Rule 1186, adopted in 1997, regulates PM10 emissions from dairies produced by wind entrainment of materials during feed preparation, and road dust from unpaved roads at dairies.)

Recent Scientific Studies of Livestock Emissions

In response to concerns of the local dairy industry that previous dairy waste emission estimates (Radian, 1991) were not based on unique local conditions, the District initiated a $130,000 study of these emissions (SCAQMD, 1996). The data from the study was re-evaluated (ATC, 2000), resulting in a revised ammonia emission factor of 51 lbs/cow/year of ammonia. Little or no information is available on emissions from calf and heifer manure. Based on current animal population data, manure data, and manure production estimates (e.g. 4.1 tons/year of manure per adult cow, 1.5 tons/year of manure per heifer and 0.6 tons/year of manure per calf), AQMD staff estimates that over 90% of the Basin's manure is from adult cows.

There is currently controversy over the VOC emission factor used for dairy waste emissions. The current emission factor is based on a 1938 methane measurement study by Ritzman and Benedict. Successive literature studies have used these measurements to establish a VOC emission factor for dairy waste emissions. Unfortunately, an error in one of the literature studies (Taback, 1978) confused the methane emissions for total organic compound (TOC) emissions. As a result, CARB has historically used a 12.8 lbs VOC/head/year emission factor. Correcting for the TOC/methane ratio, the emission factor would be 18.3 lbs VOC/head/year. In the 1997, 1999, and 2003 AQMPs, the AQMD used an emission factor of 16 lbs VOC/head/year. CARB is sponsoring additional measurement studies to resolve the issues surrounding the dairy waste VOC emission factor, but this research will not be completed within the next year.

Based on recent dairy cow population information, the latest dairy emission estimates are approximately 21 tons per day of ammonia, and 6 tons per day of VOC emissions in the 1993 (and 1997) base year in the Basin, predominately concentrated in the Chino area.

The Local Dairy Industry

A dairy farm or facility is an agricultural operation directly related to the raising cows or producing milk from cows for the purpose of making a profit or for a livelihood. In 2001, there were 312 dairies in the Basin with 252,900 milking cows. Most of the dairies (87%) are located in the Chino-Ontario-Norco region, which was a previously designated Agricultural Preserve. Most of the remaining dairies are in the San Jacinto watershed region. Most dairy farms in the Basin are "dry lot corral" dairies. Dairy cows live in open corrals, with feed lanes usually along one side of the corral. Manure is generally cleared from the feed lane into the corral, and then periodically removed from the corral, either to on-site stockpiles or off-site. The high concentration of animals per acre of land results in a larger volume of manure stored in corrals, stockpiles and to a much smaller extent, holding ponds. This high density of livestock, as well as the location of dairies, limits manure disposal options. Few dairies have

pastures on which to spread the manure, and there are only a few local composters that use the manure.

The land occupied by dairies and other livestock facilities in the Chino Basin were part of an Agricultural Preserve until recently. Land in the Agricultural Preserve could not be sold for non-agricultural purposes, placing a serious restriction on facilities that may prefer to relocate for other reasons. This is also true for livestock facilities that are under contract with the State, based on the 1965 Williamson Act. In 1997, the Agricultural Preserve designation was rescinded, allowing dairy farms to be sold for development. However, as of January 2001, two thirds of the dairy properties are still under the Williamson Act. In 1999, the Local Agency Formation Commission granted the City of Chino annexation rights to 7,000 acres and the City of Ontario the annexation rights to 8600 acres. As a result, dairy relocation in these areas has accelerated. Both cities are moving forward with development plans for the annexed areas.

In summary, urbanization pressure in the Chino Basin is causing many dairies to relocate or make plans to relocate. This is evidenced by the downward trend in the number of dairy cows, approximately 2% per year since 1997. This 2% per year relocation rate is used to determine future baseline emissions. Industry estimates that only 50% of the dairies in operation in the mid-1990s will remain permanently in the Basin. At the current rate of relocation, this level of dairies will occur by 2020. (The Inland Empire Utilities Agency (IEUA) estimates that the 50% level will be reached in 2015, indicating a 3% per year relocation rate.) With the reduction in dairy cows, emissions from dairy waste will decrease proportionally.

Recent Water Quality Regulations

In 1999, the Santa Ana Regional Water Quality Control Board (SARWQCB) adopted Order No. 99-11, "General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies and Related Facilities) within the Santa Ana Region." This order required, among other things, that 1) existing stockpiles on or off of dairies be removed by the end of 2002; 2) manure removed from the corrals must be removed form the dairies within 180 days and these "clean days" be reported to SARWQCB; and 3) manure can only be spread on cropland in agrometric rates and expeditiously incorporated into the soil. Dairies are also required to submit Annual Report of Animal Waste Discharge to the SARWQCB each year that includes dairy location, animal population, and manure disposal information (e.g., on-farm cropland application, manure hauled away and its destination), and any historical stockpiles that have not been removed. Except for a small amount of manure spread on cropland at the dairy, manure is currently hauled from the dairies to composting facilities (~20%) or applied to cropland (~80%). Before Order No. 99-11, most manure was spread on local croplands in the Santa Ana and San Jacinto regions. In 2001, and with restrictions on manure spreading in the Santa Ana region (including the former Agricultural Preserve), most manure spread on croplands is spread in the San Jacinto region (51% of total manure), with about 15% of total manure now going out of the Basin. Water quality requirements have associated air emission reduction benefits. Specifically, expedited removal of manure reduces the time over which the manure produces and emits VOCs and ammonia. Also, land application regulations restrict manure over-application to cropland and expedite the incorporation of manure into the soil, where its emission potential is significantly less.

The Inland Empire Utilities Association (IEUA) is developing state-of-the-art composting and anaerobic digester facilities. As noted in their recent Business Plan, IEUA ultimately plans that the majority of the local dairy waste will be processed at such facilities.

Other Livestock Waste Emissions

Based on the Basin's current ammonia inventory, other livestock waste, particularly poultry waste, emits appreciable levels of ammonia. However, due the geographical location of Basin poultry farms (e.g., not highly concentrated as dairies, mostly downwind of peak PM10 areas), they are not the focus of this control measure. The impact of the new PM2.5 standards, new modeling analyses, and identification of cost-effective controls, could change the status of poultry in this control measure in future SIPs.

Regulatory History

Neither the District nor any other air agency in the nation regulates criteria air emissions from livestock operations. State law previously prohibited air districts from issuing permits to agricultural activities. Agricultural operations can, however, be subject to air quality rules (c.f. Rule 403 agricultural dust control provisions). In settlement of a lawsuit challenging U.S. EPA's approval of California's Title V permitting program, U.S. E.P.A. agreed to issue a notice of proposed rulemaking no later than July 19, 2002, to implement a partial federal operating air permits program under 40 C.F.R. Part 71 for state-exempt agricultural sources. Petitioners had challenged U.S. E.P.A. approval of California's Title V program because state law exempts agricultural operations from permits from local air districts. The settlement provides that if California removes its agricultural sources permitting exemptions, U.S. E.P.A. may grant full approval to the covered Part 70 programs and discontinue the federal permit program.

As part of the rule development process, staff has followed the work of the U.S. EPA, the U.S. Department of Agriculture (USDA), and other federal and state agencies on the assessment of air emissions from agricultural operations. District staff is not aware of any specific state or federal agency that regulates ammonia or VOC emissions from dairy operations. Odor can be a complaint of people living near dairy operations. Odor control measures could have an impact on reducing ammonia and VOC emissions. Some states (such as North Carolina and Iowa) and localities have odor control policies. The policies include site selection and maintaining an adequate distance form neighboring residences and other CAFOs, adequate waste collection and drainage of feedlot surfaces, restrictions on the use of anaerobic lagoons and guidelines for the amount and time that manure can be land applied as fertilizer, among others. The livestock industry is subject to federal and state regulations for food safety, water quality, as well as other regulations.

The 1991, 1994, 1997, and 1999 AQMPs included a control measure to reduce emissions from livestock waste. Rule 1186, adopted in February 1997, implemented the primary PM10 portion of the 1997 AQMP version of WST-01.

The District is currently developing Proposed Rule 1127 (PR 1127), "Emission Reductions from Livestock Waste." PR 1127 would implement control measure WST-01. To support the District's

rule development efforts, District staff initiated a PR 1127 (Livestock Waste Management Practices) Working Group that is comprised of District staff, members of the dairy community, experts on dairy issues and other regulatory agency staff. The PR 1127 Working Group has assisted AQMD staff in developing and peer-reviewing livestock waste control research projects. An AQMD contractor has prepared a series of reports on current and potential waste management practices that could be used by Basin dairies to reduce emissions. These reports are:

Report 1: Current Livestock Waste Management Practices in the Basin
Report 2: Literature and National Program Survey
Report 3: Identification and effectiveness assessment of control options
Report 4: Recommendation of Control Options for the Basin

AQMD staff has recently initiated another contract study to identify manure and feed additives that could potentially reduce dairy waste emissions, as well as test protocols that could be used to quantify and certify the product's effectiveness.

PROPOSED METHOD OF CONTROL

Ammonia:

The proposed methods of control are primarily oriented toward reducing emissions of ammonia. As discussed previously, dairies may be moving from the Basin, and the old Agricultural Preserve area in particular, due to land use and economic reasons. The emission reductions will be achieved based on both relocation and actual control measures. The implementation of various control methods for dairy operations will follow a two-phase approach:

(1) The 1997 AQMP/PM10 SIP establishes a "carrying" capacity for ammonia emissions, particularly for livestock emissions. This "carrying" capacity is set to ensure attainment of the PM10 standards, as determined by the attainment demonstration. Emission reductions from livestock relocation outside of the Basin will be counted toward the 50% emission reduction requirement from the 1993 baseline for the livestock industry. In particular, if sufficient relocation of dairy cows and other livestock occurs or is committed to occur by January 1, 2004, no further ammonia controls will be required for the remaining livestock facilities.

(2) If the January 1, 2004 targets are not met remaining dairy and other livestock facilities will be subject to ammonia controls. The level of control will be set by the emission reductions still required to meet the 50% reduction from the 1993 baseline emissions, after reducing the inventory due to relocation. Recent staff estimates demonstrate that relocation and the impact of recent water quality regulations could reduce diary emissions by 43% from the 1993 baseline emission levels by 2006. Additional control measures to reduce ammonia emissions are described below, along with current estimates of their control efficiency and costs. Dairies and other livestock facilities will be able to choose the control method(s)

based on their own technical and economic considerations, as long as the required emission reductions are met.

Ammonia, VOC, and methane emissions are difficult to control in part because the manure cannot always be economically and quickly removed from facilities and treated. Storage in corrals and stockpiles is generally under conditions that allow for some anaerobic decomposition. To reduce emissions of ammonia (and possibly VOCs), a number of control methods could be used. An AQMD contract survey by TetraTech, Inc. has identified the following control technologies that will reduces air emissions from livestock waste. The manure handling practices are classified as "on-dairy" or "off-dairy" technologies.

1. On-Dairy Options
    a. House Keeping & Best Management Practices
        i. More frequent corral cleaning & manure removal
        ii. Eliminating manure stockpiles/reducing duration of stockpiling
        iii. Stockpile covers
    b. Nutrition/Ration management
        i. Use of somatropin
        ii. Crude protein reduction
        iii. Rumen degradable protein reduction & utilization improvement
    c. Wastewater covered anaerobic digester lagoons
    d. Wastewater storage pond covers
        i. Biofilter biomass blankets
        ii. Leca Rock
        iii. Plastic Covers
        iv. Concrete & Covered Tanks
    e. Wastewater storage pond treatments
    f. Biological/Microbial additives
    g. Chemical Additives
2. Off-Dairy Options
    a. Land application with Best Management Practices
        i. Inside Basin
        ii. Outside Basin
    b. Dairy Relocation
        i. Young stock relocation outside Basin
        ii. Dairy Relocation outside Basin
    c. Composting Inside Basin
        i. Enclosed aerated static pile (ASP)
        ii. Open ASP
        iii. Open Windrow
    d. Composting Outside Basin
        i. Enclosed ASP
        ii. Open ASP

iii. Open Windrow

e. Regional anaerobic digestion systems
f. Regional high-tech manure processing
g. Drying-combustion-energy production

Many of these potential control options cannot be sufficiently quantified for current use in a regulatory program or are not suitable or cost-effective for the type of dairying that is done in the Basin. Based on AQMD staff analysis and contract reports, the following control options are most likely to be implemented:

1. Relocation (due to farm economics only)
2. Water Quality Regulations, including:
   Bi-annual removal of manure from dairies, and
   Restricted land application of manure and land application regulations
3. Open composting (baseline condition)
4. Anaerobic digesters
5. Enclosed composting
6. Increased out-of-Basin disposal

The District recognizes that additional study will be needed to quantify additional control methods and adequately identify the related issues and impacts. Through the PR 1127 Working Group, District staff will seek the cooperation of the livestock industries, the University of California Cooperative Extension, related regulatory agencies, academia, and others to study these and other control methods. District staff also recognizes that CDFA and FDA approval may be necessary for some of the control methods, and will work with the livestock industry to ensure that cross-regulatory concerns are addressed.

Volatile Organic Compounds (VOCs):

The emission reductions associated with relocation and water quality regulations already exceed the control measure's VOC emission reduction target. Because of this, no additional control methods are explicitly required for VOC emission reductions. However, controls on ammonia emissions will result in a small amount of additional VOC reductions. These reductions will be in excess of the 2003 AQMP (Ozone SIP) requirements for this control measure.

Other Impacts

The alternative uses and disposal methods proposed herein may mitigate some water quality impacts in the Santa Ana Watershed Basin.

EMISSIONS REDUCTION

The 1997 base year emissions and projected future year emissions in 2006 and 2010 for ammonia and VOC are provided in the Control Measure Summary. The 1997 base year emissions are carried over from the 1993 baseline emission inventory estimated for the 1997 AQMP. There was very little

change between the emissions inventory for 1993 and 1997, so they are identical. In addition, the drop in baseline emissions inventory between 1997 and 2006 can be attributable to the relocation of dairy operations. Revised VOC emissions, consistent with the latest PR 1127 data sources, will be included in the final 2003 AQMP. Ammonia emissions are based on the latest emission factors and animal population data. The estimated emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average inventory for VOC and ammonia and the summer planning inventory for VOC. Ammonia emission reductions from dairy operations, either through relocation or control, are estimated to be 50 percent from 1993 emission levels. Reductions presented in the summary table take into account the relocation of dairy operations, water quality regulations, and the impact of Proposed Rule 1127.

RULE COMPLIANCE

Compliance with this control measure can be monitored through recordkeeping and inspections. The District can monitor the overall level of relocation of dairies and determine the resulting ammonia emission reductions, using SARWQCB annual data. Depending on the control options implemented, the District may require one or more of the following: proof of the use of alternate feeds to reduce emissions; repair records for leaking water troughs and piping; the date of manure removal from feed lanes, corrals or dairy stockpiles along with certification by the person performing the activity; acreage of the corrals and stockpile areas, and the type and quantity of ammonia inhibitor used (if any). If the measure is ultimately extended to poultry farms, their operators could periodically submit to the District the following information: the maximum number of poultry managed during the preceding six months; and the type and quantity of ammonia emission inhibitor used.

COST EFFECTIVENESS

The predominant control options are shipping manure out of the basin, processing it at anaerobic digesters, or processing it at a control composting facility. Cost for disposal actions are $7.50/ton of manure shipped to the San Jacinto area in the Basin, $12/ton for shipping/tipping at a current (open-windrow) composting facility, $13/ton for shipping to Bakersfield (out-of-Basin), $16/ton for shipping to the Mojave desert or Imperial county, and $20/ton for tipping at an anaerobic digester. Based on farmers choosing the most inexpensive control option (shipping out of the Basin), preliminary cost-effectiveness estimates range from $2,000 to $7,000 per ton of ammonia reduced. Rule development will further refine the cost-effectiveness estimate. (The VOC emission reduction target is achieved without further control, thus no cost-effectiveness calculations for the control measure are necessary.)

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to implement this measure. Implementation is scheduled to begin in 2004, with full implementation in 2006. The SARWQCB continues to be responsible for implementing Order No. 99-11 and other water quality regulations for local dairies.

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EMISSION REDUCTIONS FROM COMPOSTING [VOC, NH_3, PM10]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	COMPOSTING AND RELATED OPERATIONS		
CONTROL METHODS:	ALTERNATIVE COMPOSTING METHODS, EMISSION CONTROL EQUIPMENT		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1997**	**2006**	**2010**
VOC INVENTORY	6.8	6.8	6.8
VOC REDUCTION		1.2	1.2
VOC REMAINING		5.6	5.6
NH_3 INVENTORY	4.7	4.7	4.7
NH_3 REDUCTION		1.9	1.9
NH_3 REMAINING		2.8	2.8
SUMMER PLANNING INVENTORY	**1997**	**2006**	**2010**
VOC INVENTORY	6.8	6.8	6.8
VOC REDUCTION		1.2	1.2
VOC REMAINING		5.6	5.6
CONTROL COST:	$10,000 PER TON OF VOC AND NH_3 REDUCED		
IMPLEMENTING AGENCY:	SCAQMD, LOCAL GOVERNMENTS		

DESCRIPTION OF SOURCE CATEGORY

The 1994 and 1997 AQMPs as well as the 1999 amendments to the 1997 Ozone State Implementation Plan (SIP) for the South Coast Air Basin included the proposed Control Measure WST-02 – Emission Reductions from Composting. The control measure was proposed to be implemented in two phases. Under Phase I, an emissions inventory of composting operations would be developed based on additional source tests and improved test protocols. Depending on the significance of these emissions, Phase II would identify specific control options to reduce emissions (VOC and ammonia) from composting activities. In order to implement the proposed control measure, AQMD staff conducted a technical assessment for composting and related operations which provided background information on the composting industry, estimated the emissions inventory for composting operations, evaluated various composting methods and control technologies, and conducted cost-effectiveness analysis (SCAQMD, 2002). The proposed control measure presented herein incorporates the results of the technology assessment.

Background

Composting is a biological process where organic materials including, but not limited to, biosolids (solid waste from wastewater treatment), manure, or greenwaste (grass clippings, tree trimming, leaves) are

decomposed by microorganisms under controlled environment to produce compost products. In general, compost is a stable, pathogen-free product that can be used as a soil amendment and/or fertilizer. From an industrial perspective, composting is an important component of the solid waste industry and it provides resource conservation through source reduction, recycling, and reuse. However, the composting operations result in air emissions that are currently uncontrolled and are not subject to any District source-specific regulation. Source testing conducted by the District and California Integrated Waste Management Board (CIWMB) have indicated that composting and related operations contribute to significant levels of volatile organic compounds (VOC) and ammonia (NH_3) emissions in the South Coast Air Basin.

VOCs are of concern because they contribute to the formation of ozone, and also transform into organic aerosols in the atmosphere, contributing to higher PM10 levels and lower visibility. Ammonia is of concern because it reacts in the atmospheric with nitrates and sulfates to form secondary particles, which make up a substantial portion of PM10. Ozone is classified as a criteria pollutant and is considered to be a deep lung irritant, causing respiratory problems. PM10 is also classified as a criteria pollutant and is of concern because particles less than 10 microns can be deposited in, and can damage, the airways of the lower respiratory tract and the gas-exchange portions of the lung.

The composting and related operations industry consists of composting and chipping and grinding facilities. Based on information obtained from the CIWMB's permit database, District permit system, District-conducted surveys, and field inspections, 277 facilities have been identified within this industry. These facilities can be classified into four main categories: 1) co-composting facilities; 2) greenwaste composting facilities; 3) chipping and grinding facilities; and, 4) small/non-commercial composting facilities. Co-composting facilities include composting facilities that use putrescible materials, such as, biosolids and/or manure in combination with greenwaste or foodwaste to produce compost products. Greenwaste composting facilities are composting facilities that use greenwaste as raw feedstock materials or greenwaste combined with small amounts of manure. Chipping and grinding facilities are facilities dedicated to the size reduction of greenwaste or wood waste to be used in composting, as alternative daily cover (ADC) for landfills, as feedstock for waste-to-energy facilities, or for producing mulch. Small/non-commercial composting facilities include operations such as nurseries, recreational composting, community composting, and portable chipping/grinding activities.

The technology assessment provided an analysis of several composting control methods available to industry including: windrow, enclosures, forced aeration systems, and in-vessel composting. Emissions from composting operations conducted inside enclosures or using forced aeration systems and in-vessel systems can be vented to emission control equipment such as biofilters. Forced aeration and in-vessel systems can also be enclosed, with all emissions vented to control equipment. Also available are other composting methods that employ variations of in-vessel and forced-air aeration systems that may be considered as closed-loop systems capable of achieving very high capture and control efficiencies. In this region, with the exception of three facilities, the predominant method of co-composting is windrow composting. In windrow composting, materials are moved with front-end loaders into long piles called windrows. Aeration for this method of composting is achieved mechanically by the turning of the piles with front-end loaders or scarabs machines. The temperature and moisture are monitored to optimize

and hasten decomposition. After two to four months in the windrows, the material becomes compost. Based on the analysis conducted in the technology assessment, control methods and technologies exist today that can significantly reduce emissions from co-composting operations.

Regulatory History

Composting operators are required to comply with District Rule 401 - Visible Emissions, and Rule 403 - Fugitive Dust. Chipping and grinding operators are required to comply with the previously mentioned rules as well as with Rule 402 – Nuisance. Operators of both composting and chipping and grinding facilities may also have equipment requiring permits under Rule 203 - Permit to Operate. The CIWMB has also promulgated a set of regulations governing composting operations and facilities. Depending on the type of composting materials and the throughputs, affected facilities are required to obtain a Registration Permit, a Standardized Composting Permit, or a Full Solid Waste Facilities Permit (Full Permit). Full Permits require the preparation of an Environmental Impact Report (EIR) and are issued by CIWMB while Registration and Standardized Permits are issued through local enforcement agencies (LEAs), such as the environmental health departments. Also, the CIWMB is currently proposing amendments to its regulations, in part, to address the increasing number of odor complaints by requiring an Odor Impact Minimization Plan (OIMP) which must be developed by each facility. For a summary of the regulatory programs that are applicable or pertinent to the composting and related operations industry, refer to the technology assessment report.

At the April 2002 Board meeting, the District's Governing Board conducted a Pre-Hearing on controlling VOC and ammonia emissions from composting and related operations and received staff's Technology Assessment Report. The technology assessment identified and evaluated a number of feasible control technologies for co-composting operations and also included recommendations for a registration program for composting related facilities as well as holding time requirements for greenwaste chipping and grinding activities. Accordingly, the Governing Board directed District staff to proceed with rulemaking and to develop a series of proposed rules to address each sector of the composting and related operations industry independently. Also, a Composting Technical Advisory Committee (CTAC) was established to oversee the on-going technical studies of cost-effective composting control technologies and assist District staff during rule development. In addition, a Co-Composting subcommittee to CTAC was subsequently formed to further evaluate specific issues related to controlling emissions from co-composting operations. Proposed Rules 1133, 1133.1 and 1133.2 currently being developed by District staff are for the most part based on the technology assessment as well as subsequent analysis conducted by District staff.

PROPOSED METHOD OF CONTROL

This control measure will be implemented in two phases. Under phase 1, a series of rules will be developed and implemented which would: 1) set forth general administrative/registration requirements for composting and chipping and grinding facilities; 2) establish holding and/or processing (e.g., chipping and grinding, on-site applications) time requirements for greenwaste in order to prevent inadvertent decomposition from occurring at chipping and grinding facilities associated with stockpiling

greenwaste for extended periods of time; and, 3) set forth VOC and ammonia emission reduction requirements for the co-composting sector of the composting and related operations industry.

Under the first phase of this control measure, operators of co-composting operations will be required to achieve VOC and ammonia emission reduction targets using any combination of composting methods and control technologies included, but not limited, to enclosures, aeration systems, best management practices, process controls, as well as add-on control devices, such as biofilters. Proposed Rules 1133, 1133.1 and 1133.2 would implement the first phase of this control measure.

The second phase would include the identification of control options to reduce VOC and ammonia emissions from greenwaste composting and food waste composting operations. This would include refinement of the emissions inventory as well as identification of cost-effective emission reduction strategies (e.g., best management practices, operational controls, etc.) for these sectors of the industry. Although emissions from greenwaste composting operations are significant (approximately 4.6 tons of VOC and 1 ton of ammonia per day) and control options for these operations could result in significant reductions, the affordability analysis presented in the technology assessment demonstrated that the cost impact for this industry would be substantial. Therefore, specific control requirements are not proposed for greenwaste composting operations under the proposed rules 1133 series. Staff would, however, continue to work with all stakeholders including the California Integrated Waste Management Board (CIWMB), sanitation districts and local municipalities to seek funding sources and identify feasible control methods for greenwaste composting operations.

EMISSIONS REDUCTION

The emissions inventory and reductions for this control measure are summarized in the Control Measure Summary table. The emissions inventory for this industry is estimated at 6.8 and 4.7 tons per day of VOC and ammonia respectively for both co-composting and greenwaste composting operations. Emissions from co-composting operations are estimated at 1.7 and 2.7 tons per days for VOC and ammonia, respectively; and emissions from greenwaste and other composting operations are estimated at 5.1 and 2 tons per day of VOC and ammonia, respectively.

Implementation of this control measure for co-composting operations is expected to result in VOC and ammonia emission reductions of 1.2 and 1.9, respectively, representing a 70% overall reduction of VOC and ammonia emissions from existing co-composting operations. During phase 2, the District staff will continue to work with all stakeholders and affected industries to refine emission estimates and identify feasible control methods for greenwaste and food waste composting operations.

RULE COMPLIANCE

Compliance with this control measure would be determined and verified by source testing, site inspections, record keeping and reporting requirements.

TEST METHODS

Source testing for VOC and NH_3 would follow EPA or approved District guidelines or test methods such as District Method 25.3, EPA Method 24, and District Method 207.1. Alternative test methods may be used subject to the approval of EPA, ARB, and the District.

COST EFFECTIVENESS

The cost-effectiveness of reducing emissions from co-composting operations is estimated to be $10,000 per ton of VOC and NH_3 reduced. This cost-effectiveness calculation is based on a combination of concrete enclosures, aeration systems, and biofilters for existing facilities.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to implement this control measure, and would work in cooperation with local governments that issue solid waste facility permits. This control measure would be implemented beginning in 2007 with full implementation by the end of 2009.

REFERENCES

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EMISSION CHARGES OF $5,000 PER TON OF VOC FOR STATIONARY SOURCES EMITTING OVER 10 TONS PER YEAR [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	STATIONARY SOURCES OF VOC EMITTING OVER 10 TONS PER YEAR
CONTROL METHODS:	EMISSION CHARGES
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, POSSIBLY REQUIRING ADDITIONAL LEGISLATION

DESCRIPTION OF SOURCE CATEGORY

Background

District records indicate that there are approximately 410 facilities with VOC emissions greater than or equal to ten tons per year in the Basin. Although these facilities represent approximately ten percent of the total number of VOC-emitting facilities, these larger VOC facilities represent approximately 80 percent of the total VOC emissions from stationary sources in the Basin. These facilities represent a variety of emission sources such as, but not limited to, coatings, solvents, graphic arts materials, and fugitive emissions from refineries and chemical plants.

The Lewis Presley Air Quality Management Act authorized the South Coast Air Quality Management District to collect fees based on emissions. Fees collected would be used for administrative purposes only. Since 1977, the District has collected emission fees from owners or operators of permitted equipment based on the total annual weight of VOC emissions. This contingency control measure proposes to impose an emission charge of $5,000 per ton of VOC for stationary sources emitting over ten tons per year.

Regulatory History

Pursuant to Health and Safety Code Section 40510, the District has the authority to adopt a fee schedule for the issuance of permits to cover the cost of evaluation, planning, inspection, and monitoring related to that activity. Under Rule 301 - Permit Fees, the District requires facilities with permitted equipment to pay an annual emissions fee, in addition to the annual operating permit fee. The emissions fee is based on the total weight of emissions of each pollutant emitted, and is assessed on facilities with total annual emissions greater than four tons.

PROPOSED METHOD OF CONTROL

The l990 federal Clean Air Act requires that the AQMP include all control measures, means or techniques, including economic incentives such as fees, as may be necessary to reach attainment. Further, the Act requires that all stationary sources of VOC emissions (greater than 10 tons per year)

in an extreme nonattainment area that has failed to attain the ambient air quality standard for ozone pay a fee as a penalty for such failure (Title I, Section 185).

This control measure proposes that if the federal ambient air standards are not met by the year 2010, an emissions fee of $5,000 for each ton of VOC emissions in excess of ten tons per year shall be imposed on each facility. The fee shall be paid for each calendar year after the year 2010 and until the area is redesignated as an ozone attainment area. This fee will be in addition to the annual emission fee required by District Rule 301.

EMISSIONS REDUCTION

Implementation of this measure is expected to result in emission reductions as facilities seek to further reduce emissions to reduce the fees proposed by this measure. Projected emission reductions are uncertain at this time, and require further analysis.

TEST METHODS

VOC test methods must follow EPA or District approved guidelines or test methods. EPA and District-approved VOC test methods include the following:

1. EPA Reference Test Method 24 (CFR Title 40, Part 60, Appendix A) - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings.

2. SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" Manual - VOC Concentration of Materials, Test Method #304.

Alternative guidelines may be used provided they are first approved by the EPA, ARB, and the District.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority under the Lewis Presley Air Quality Management Act to collect fees based on emissions. However, implementation of this control measure may require additional legislation.

REFERENCES

South Coast Air Quality Management District. Rule 301 - Permit Fees. Amended June 1993.

MITIGATION FEE PROGRAM FOR FEDERAL SOURCES [NO_X]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	FEDERAL SOURCES (AIRCRAFT, SHIPS, TRAINS, OTHER PREEMPTED SOURCES)
CONTROL METHODS:	MITIGATION FEE PROGRAM
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, U.S. EPA; POSSIBLY REQUIRING ADDITIONAL LEGISLATION

DESCRIPTION OF SOURCE CATEGORY

Background

The regulation of emissions from ships, aircraft, trains, and off-road farm and construction equipment less than 175 horsepower (HP) is under federal jurisdiction. Emissions from these federal sources continue to represent a significant and increasing portion of the emissions inventory in the South Coast Air Basin. Recent emissions inventory studies and forecasts for aircraft, marine vessels, and locomotives indicate that activity and emissions from these sources are increasing.

The U.S. EPA has indicated that it would be difficult to adopt national rules which are sufficiently stringent enough to achieve the emissions reductions anticipated from federal sources necessary for the South Coast Air Basin in time to attain the federal ozone standard. Without adequate controls of these sources, however, the emissions reduction burden would have to be shifted to other stationary and mobile sources that have been regulated for many years.

Regulatory History

Locomotive, Aircraft, and Ships

In 1998, EPA adopted regulations affecting all new or remanufactured locomotives after January 1, 2000. Specific emission standards found in 40CFR Part 92 depend on the date of manufacturer or remanufacture and the type of duty-cycle, but may go as low as 5.5 g/bhp-hr NO_x (Tier 2) and 0.2 g/bhp-hr PM (Tier 2) for line-haul locomotives manufactured on or after January 1, 2005.

In addition, Measure M14 – National Emission Standards for Locomotives in the 1997 AQMP required low-emission locomotives to completely replace existing locomotives in the Basin by 2010. Control Measure #97M14 applied to all types of locomotives and assumed that EPA would develop a two-tiered national NO_x emission standard. In adopting measure M14, ARB assumed that by 2010, locomotive fleets in the Basin will be required to emit a fleet-wide average of no more than the EPA's established Tier 2 emission level. To this end, ARB staff developed a Memorandum of Mutual

Understandings and Agreements (Memorandum) with the California Railroads and the U.S. EPA that was signed in July 1998. The Memorandum includes provisions for early introduction of clean locomotives in the Basin, which will meet the fleet-wide average target by 2010.

The International Maritime Organization (IMO) established NO_x standards in 1997 that apply to marine vessel engines over 130 kW installed on new vessels. IMO standards do not become enforceable until ratified by at least 15 countries. This has not happened yet, and the U.S. is one of the countries that has not ratified the standards. EPA adopted emission standards for commercial marine vessels in 1999 (40CFR Part 94). These standards primarily apply to commercial harbor craft since the large engines (i.e., 30 liters per cylinder) used by ocean-going ships are not covered by Part 94. However, the EPA is currently proposing additional emission standards for these large engines which are expected to be adopted in 2003. However, the net emission benefit associated with these regulations is expected to be minimal in 2010 because of their lack of stringency and the slow turnover rate of engines.

Aircraft emissions are regulated by the International Civil Aviation Organization (ICAO) and EPA. Current standards (HC, NO_x, smoke) are based on engine thrust and vary depending on the engine pressure ratio. These standards are also not expected to achieve any significant reductions by 2010. Currently, military aircraft are exempt from these engine standards. The EPA and FAA have jointly sponsored a national stakeholder group whose goal is to define emission reduction targets for air carriers beyond 2010 (CARB, 2002).

California SIP

The 1990 CAA Amendments required California to submit by November 1994 a SIP revision demonstrating that the South Coast Air Basin would attain the NAAQS for ozone by 2010, the statutory deadline for "extreme" ozone nonattainment areas. The AQMD and CARB in the 1994 SIP submittal concluded that it would be necessary for EPA to adopt specific measures regulating sources of pollution subject to exclusive federal jurisdiction, such as trains, ships, and aircraft. In approving the state's SIP submittal, EPA agreed, stating " . . . EPA recognizes that massive further reductions are needed for attainment in the South Coast and that attainment may be either very costly and disruptive or impossible if further reductions are not achieved from national and international sources." 62 Federal Register 1149, 1152-1153 (January 8, 1997).

EPA proposed to approve the 1994 SIP, stating: "While EPA does not believe that the CAA authorizes a state to assign responsibility to the Federal government for meeting SIP requirements, the Agency agrees that it has both the authority and responsibility under the Act for regulating certain national sources of air pollution." 61 Federal Register 10920, 10936 (March 18, 1996). Therefore, EPA in approving the 1994 SIP made a commitment, "enforceable by citizens," to undergo a described "consultative process," and to adopt the "controls determined by that process to be appropriate" for EPA. (62 Federal Register p. 1153.) EPA further explained, "EPA has authority to commit itself to promulgate additional Federal measures determined through the consultative process to be appropriate, under CAA §301." (Id., p. 1154.)

At the same time, EPA required California to submit "before EPA's final action on the South Coast plan, an enforceable commitment to submit a revised South Coast attainment demonstration and gap-filling State or local control measures, if needed, after the consultative process." (61 Federal Register, p. 10923.) CARB submitted such a commitment, which EPA approved. (62 Federal Register, p. 1153.) The net result of EPA's action was that California (through CARB) ultimately committed to taking all measures needed to attain the NAAQS, no matter how disruptive or infeasible, if EPA did not determine sufficient measures to be "appropriate" for federal action.

The existing regulations on federal sources are not expected to result in significant emission reductions prior to 2010. As the AQMD and CARB prepare to update the South Coast SIP in 2003, it is anticipated that additional reductions would be necessary from federally regulated sources. Without an assurance that EPA will identify and commit to additional regulations and considering the attainment deadlines of 2006 for PM10 and 2010 for ozone, the District is proposing Control Measure FSS-05 to ensure federal sources contribute their fair share to achieving federal ambient air quality standards.

PROPOSED METHOD OF CONTROL

As an alternative to stringent national rules and to achieve a fair share reduction commitment by federal sources to address unique local needs, this control measure proposes a mitigation fee program administered by the District and paid for by U.S. EPA or federal sources. The District will use the monies collected to solicit proposals from both federal and non-federal sources to achieve equivalent reductions for SIP purposes. Under this control measure, U.S. EPA would be responsible for reducing NO_x emissions from federal sources to the level set forth in the 1999 Amendment to the Ozone SIP for the South Coast Air Basin. The mitigation fee is assumed to be comparable to mobile source NO_x control technologies.

The program would be similar to the District's Emission Mitigation Fee Program for Power Producing Facilities (Regulation XX - RECLAIM) and to the Carl Moyer Memorial Air Quality Standards Attainment Program. The RECLAIM Emission Mitigation Fee Program is a program where power producing facilities that exceed annual allocations and meet specified applicability requirements in Rule 2004 pay a participation fee to the District for generation of NO_x emission reductions by the District to mitigate emission exceedances. The statewide Carl Moyer Memorial Air Quality Standards Attainment Program provides grants to offset the incremental cost of projects that reduce emissions of NO_x from covered sources in California.

EMISSIONS REDUCTION

The 2010 baseline inventory for ships, aircraft, and trains is estimated to be approximately 102 tons of NO_x per day which is approximately 40 percent of the off-road mobile source 2010 inventory and 14 percent of the total 2010 NO_x inventory in the Basin. To reduce emissions from these sources to the 2010 level projected in the 1997 AQMP (i.e., 63 tons of NO_x per day) would require a 38 percent reduction from the 2010 baseline. It should be noted that these inventory and emission reduction values do not account for other preempted federal sources (e.g., off-road farm and construction equipment less than 175 HP) which may also be expected to be targeted by this control measure.

TEST METHODS

The appropriate test method(s) would depend on the specific NO_x emission reduction projects undertaken.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority under the Lewis Presley Air Quality Management Act to collect fees based on emissions. However, implementation of this control measure may require additional legislation. EPA would appropriate funding or enable collection of monies in lieu of control. The District would then fund cost-effective reduction projects with the collected funds.

REFERENCES

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CARB, Proposed Clean Air Plan, March 2002.

California Health and Safety Code §44280

Federal Register: Vol. 61, No. 53, pages 10920, 10923, and 10936, March 18, 1996 (Approval and Promulgation of State Implementation Plans; California – Ozone. Notice of proposed rulemaking.)

Federal Register: Vol. 62, No. 5, pages 1149, 1152 - 1154, January 8, 1997 (Approval and Promulgation of Implementation Plans; California –Ozone. Final Rule.)

Federal Register: Vol. 64, No. 141 pages 39923 - 39927, July 23, 1999 (Approval and Promulgation of State Implementation Plans; California –South Coast. Final Rule.)

GROUP 6

Compliance Flexibility Program

ECONOMIC INCENTIVE PROGRAMS [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ALL SOURCE CATEGORIES
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS
EMISSIONS:	IMPLEMENTATION OF THIS CONTROL MEASURE IS EXPECTED TO PROMOTE AND COMMERCIALIZE ADVANCED AIR POLLUTION TECHNOLOGIES.
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure is designed to enhance the District's existing regulatory programs to maximize compliance flexibility, minimize compliance costs, and to promote the commercialization of advanced pollution control technologies. In concept, this control measure proposes to expand the existing trading market to allow broader trading of mobile and stationary source emission credits, develop pilot credit trading rules between mobile and stationary sources including potential credits for new source review, develop clean air investment funds and other market incentive approaches.

Background

In April 1995 the District conducted the Intercredit Trading Study to assess the existing market-based regulatory programs and to identify potential enhancements for cost-effective air quality solutions. After a series of public workshops and public meetings the District staff presented a white paper titled, "Intercredit Trading Study - Proposed Recommendations and Action Plan" to its Governing Board in March 1996. This paper identified specific enhancements to the existing regulatory program that would provide additional compliance flexibility while promoting the commercialization of advanced pollution control technologies.

The 1997 AQMP included control measure FLX-01 formerly titled, "Intercredit Trading." The 1997 AQMP control measure was based on recommendations from the Intercredit Trading Study white paper and presented concepts for developing an universal trading market with stationary and mobile sources.

Over the past decade, the District has adopted a series of programs that incorporate a variety of different market incentive approaches such as emissions trading programs, mitigation fee programs, clean air investment programs, and averaging. Staff will continue to work collaboratively with EPA, ARB, industry and other interested parties to expand trading programs and address issues related to economic growth and compliance flexibility.

Emissions Trading Programs

Emissions trading programs include programs where emissions trading credits are generated by one source and used by another. Emission reduction credits are used in a variety of SCAQMD programs. Under Regulation XIII – New Source Review, emission reduction credits (ERCs) are used to offset emission increase from new and modified sources. Some Regulation XI – Source Specific Rules, Regulation XX – RECLAIM, and Rule 2202 allow the use of mobile source emission reduction credits (MSERCs) as a compliance alternative. MSERCs must be generated pursuant to an emission reduction protocol under Regulation XVI – Mobile Sources Credits.

Mitigation Fee Programs

The concept of the mitigation fee program is to allow sources to pay a specified dollar per pollutant fee in lieu of directly complying with an emission limit. The fee would be used to purchase emission reductions. The use of a mitigation fee approach was introduced in Rule 1121 – Residential Gas-Fired Water Heaters. Under Rule 1121, water heater manufacturers can pay a mitigation fee of $2.70 per pound NO_x emission reductions that can be used in lieu of directly complying with the NO_x emission limits. The mitigation fee under Rule 1121 is temporary, and is allowed as an alternative to complying with an interim NO_x emission limit.

In the May 11, 2001 amendments to the Regulation XX – RECLAIM, a Mitigation Fee Program was incorporated for power producing facilities. Under Rule 2020 – RECLAIM Reserve, power producing facilities that meet specified criteria can purchase NO_x emission reductions for $7.50 per pound of NO_x to meet their annual allocation requirements. The SCAQMD would use the money to fund projects that will achieve the needed NO_x emission reductions.

Air Quality Investment Programs

The concept of the Air Quality Investment Program (AQIP) is based on sources paying a fee to the SCAQMD that is used to fund emission reduction projects. The emission reductions can then be used by facilities as an alternative to directly complying with specific emission reduction requirements.

The AQMD has three types of air quality investment programs, under Rule 2202 - On-Road Motor Vehicle Mitigation Options, Rule 2501 – Air Quality Investment Program (AQIP), and Rule 2020 – RECLAIM Reserve. Under Rule 2202, facilities have the option to pay into an AQIP to purchase emission reductions to meet specified ridesharing requirements. The Rule 2202 AQIP has funded a variety of mobile source emission reduction control strategies from on-road vehicles, off-road vehicles, and marine vessels. To date, the Rule 2202 AQIP has generated over 2,291 tons of NO_x, 9,151 tons of CO, and 1,732 tons of VOC emission reductions.

The Rule 2501 AQIP is a broader AQIP where sources that are subject to Regulation IV and XI source specific requirements can purchase emission reductions generated from stationary and mobile sources as an alternative to directly complying with specific emission limits. Although there have been facilities that have requested to participate in the Rule 2501 AQIP, no emission reductions have been

issued from this AQIP since there has been no pre-funding of emission reductions since the inception of the program and EPA has not approved Rule 2501.

The Rule 2020 AQIP is a temporary AQIP of NO_x emission reductions for RECLAIM facilities that meet specific participation requirements. Provided there are NO_x emission reductions available, certain RECLAIM facilities can pay $7.50 per pound of NO_x to meet their annual allocation requirements. The Rule 2020 AQIP will rely on mobile source emission reduction protocols under the pilot credit generation program as discussed in more detail below.

Other Market Incentive Approaches

Other types of market incentive approaches include averaging and banking. The concept of emissions averaging is based on averaging emissions to meet an overall emission limit. Rule 1113 – Architectural Coatings includes a provision that allows manufacturers' to average emissions from different coatings to comply with an overall emission limit. The concept of banking is based on saving emission credits generated in one year for use in another year. EPA has included an averaging and banking approach as an alternative to complying with emission limits for marine vessel standards under 40 CFR Part 94. The averaging provision allows engine manufacturers' to certify one or more engine families above the applicable emission standard provided the emissions increase is offset by one or more families certified below the emission standard. The banking provision allows engine manufacturers' to generate emission credits to bank for their future compliance use or another manufacturers' use.

Regulatory History

In 2001, the AQMD adopted six mobile and area source pilot credit generation rules: Rule 1612.1 – Mobile Source Credit Generation Pilot Program; Rule 1631 – Pilot Credit Generation Program for Marine Vessels; Rule 1632 – Pilot Credit Generation Program for Hotelling Operations; Rule 1633 – Pilot Credit Generation Program for Truck/Trailer Refrigeration Units; Rule 1634 – Pilot Credit Generation Program for Truck Stops; and Rule 2507 – Pilot Credit Generation Program for Agricultural Pumps. NO_x emission reductions generated from these pilot credit generation rules can be used in the RECLAIM program either directly or through the RECLAIM Reserve for the Mitigation Fee Program for power producing facilities or the Rule 2020 AQIP for specific RECLAIM facilities. All six pilot credit generation rules have been submitted to EPA for inclusion in the SIP. The five pilot credit generation rules, Rules 1612.1, 1631, 1632, 1633, and 2507 have been approved by CARB and EPA. Rule 1634 is currently being reviewed by EPA.

Economic Incentive Guidelines

In January 2001, the EPA finalized their guidance document for "Improving Air Quality with Economic Incentive Programs" (EIP). The EIP is designed to encourage cost-effective innovative approaches to achieving air pollution goals. The guidance document outlines economic incentive programs that states and local areas may incorporate in their State Implementation Plans for meeting air quality standards.

The EIP outlines four main types of economic programs: emissions trading programs, financial mechanism programs, clean air investment funds, and public information. The EIP also outlines key

principles that must be incorporated in an economic incentive program to receive EPA approval such as the integrity of emission reduction credits, protection of health and welfare from use of emission credits, and assurance of an environmental benefit.

Federal Clean Air Act

Since 1970, the federal Clean Air Act has required that states adopt regulations designed to attain ambient air quality standards. The Act generally has allowed the states to choose the appropriate type and mix of control strategies used to achieve attainment. In 1977 and 1990 Congress amended the Act to specify certain emission control requirements that each state regulatory program must impose. Nevertheless, the basic concept that states may choose the appropriate type and mix of control strategies has been retained as long as the specific control requirements of the Act are met (Sections 110, 172, and 182). Thus in general, the federal Clean Air Act does not prohibit the SCAQMD from expanding or linking emissions trading programs.

EPA has promulgated rules for economic incentive programs (EIPs) which either may or must be adopted by States for certain ozone and carbon monoxide nonattainment areas upon the failure of States to submit an adequate showing that an applicable reasonable further progress (RFP) milestone has been met pursuant to CAA Section 182(g)(3) and (5). These rules require that EIPs be submitted to the EPA for approval as part of the SIP and that they contain provisions to ensure the following: (1) the program will not interfere with other CAA requirements; (2) emission reductions credited are quantifiable; (3) creditable emission reductions are consistent with SIP attainment and RFP demonstrations; (4) reductions are surplus to reductions required by, and credited to, other SIP provisions in order to avoid double-counting of reductions; (5) the program is enforceable by State and Federal authorities; and (6) all creditable emission reductions are permanent. (See 40 Code of Federal Regulation (CFR) Sections 51.490 to 51.494 and 59 Federal Regulation (FR) 16690 et seq., April 7, 1994).

PROPOSED METHOD OF CONTROL

This control measure is a voluntary program to provide additional compliance flexibility to regulated sources in the Basin, provide incentives for the early installation and commercialization of advanced pollution control technologies, and lower overall compliance costs. District pilot credit generation programs will be expanded to generate short-term credits for NSR purposes.

EMISSIONS REDUCTION

Implementation of this control measure is expected to accelerate emission reductions during the early years of the program through development and commercialization of advanced pollution control technologies, and produce a net air quality benefit. Due to the voluntary nature of this control measure, potential emission reductions associated with the early introduction of advanced pollution control technologies cannot be quantified. As currently proposed, implementation of this control measure is not designed to result in direct emission reductions since emission reductions associated with credit generation activities would be offset by the use of the emission credits. Thus, although no direct

emission reductions are anticipated, it is important to note that this control measure will be designed to ensure that the added compliance flexibility does not compromise the Basin's overall progress towards achieving its air quality attainment goals.

RULE COMPLIANCE AND TEST METHODS

Compliance with the provisions of this control measure would be based on monitoring, recordkeeping, and reporting requirements that have been established in existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

Emissions quantification protocols will establish the appropriate test methods that applicable source categories will be required to use when generating and using emission credits under this program.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. Since this measure is voluntary, implementation of this control measure is expected to reduce the overall cost of compliance with District rules and regulations. Implementation of this control measure is expected to maximize trading opportunities and provide sources with more cost-effective compliance methods. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from stationary sources.

REFERENCES

South Coast Air Quality Management District. "Intercredit Trading Study. Proposed Recommendations and Action Plan." January 1996.

SECTION 2
CONTINGENCY MEASURES

INTRODUCTION

This appendix contains the contingency control measures for the draft 2003 AQMP. Both the state and federal Clean Air Acts require that the AQMP contain contingency measures in the event that the District fails to either achieve interim emission reduction goals or maintain adequate progress towards attainment of ambient air quality standards.

The expected progress in meeting the AQMP attainment goals, measured in terms of emission reductions, is verified through the annual auditing program called the Reasonable Further Progress (RFP) program. In the event the RFP shows that the implementation of the AQMP is not providing adequate progress and the interim emission reduction goals have not been met, the District must take action to bring forward measures that are scheduled for later adoption or implementation, or to implement certain "contingency" control measures. The contingency measures contained in this appendix are designed to ensure that an appropriate level of emission reductions progress continues to be made. In addition, these contingency measures are control options that could be instituted in addition to, or in place of, the AQMP control measures.

Contingency Measures

The draft 2003 AQMP contains 3 contingency control measures. Although implementation of these measures is expected to reduce emissions, there are issues that limit the viability of these measures as AQMP control measures at this time. Issues surrounding these measures include, but are not limited to the availability of District resources to implement and enforce the measure, cost-effectiveness of the measure, potential adverse environmental impacts, potential economic impacts, effectiveness of emission reductions, and availability of methods to quantify emission reductions. Table 1 lists the contingency control measures and adoption/implementation issues associated with the measure. The responsibility to adopt and implement the measures falls on the District, ARB, and EPA.

TABLE 1

Contingency Control Measures

AQMP Measure Number	Title	Issues
CTY-1	Accelerated Implementation of Control Measures	Resource Availability
CTY-4	Enhanced Oxygenated Fuel Content for CO	Potential NO_X Emission Increases
CTY-14	Emission Reductions from Miscellaneous Sources (Weed Abatement)	Unquantified Emission Reductions

FORMAT OF CONTROL MEASURES

Included in each control measure description is a title, summary table, description of source category, proposed method of control, estimated emission reductions, rule compliance, test methods, cost effectiveness, and references. The type of information that can be found under each of these subheadings is described below.

Control Measure Number

Each control measure is identified by a control measure number (such as "CM #2003CTY-01") located at the upper right hand corner of every page. "CM #" is the abbreviation for "control measure number" and is immediately followed by the year of the AQMP revision (such as "2003" for 2003). The next designation represents the source category or control measure type;; for example "CTY" represents contingency measure.

Summary Table

Each measure contains a table that summarizes the measure and is designed to identify the key components of the control measure. The table contains a brief explanation of the source category, control method, emission reductions, control costs, and implementing agency.

Although initial assessments to identify the potential magnitude of emission reductions and cost effectiveness of these measures has been conducted, fully quantified emission reductions and control cost are not included for Level I and II measures at this time. If these measures should undergo rulemaking and as additional data and information becomes available, the emission reductions and cost effectiveness of these measure will further be assessed and fully quantified.

Information Contained in Measures

Similar to the stationary source control measures in Section I of this appendix, each of the measures contain the following sections:

- **Description of Source Category** provides an overall description of the source category, number of sources in the Basin, description of emission sources, and regulatory history.
- **Proposed Method of Control** includes applicable emission control technologies, expected performance such as projected control efficiency, and current applications.
- **Emission Reductions and Cost Effectiveness:** As previously indicated, emission reductions and control costs associated with the measures is not included in this appendix. As the more data and information becomes available regarding quantification of potential emission reductions, these measures will be updated.
- **Rule Compliance and Test Methods** refers to the applicable monitoring, recordkeeping and reporting requirements envisioned to ensure compliance. The test method section refers to appropriate approved District, ARB, and EPA source test methods.
- **Implementing Agency** is the agencies responsible for implementing the control measure. Also included in this section is a description of any jurisdictional issues that may affect the control measures implementation.

CONTINGENCY MEASURES

ACCELERATED IMPLEMENTATION OF CONTROL MEASURES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	STATIONARY SOURCE CONTROL MEASURES
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS
EMISSIONS (TONS/DAY):	NOT DETERMINED (SEE EMISSIONS REDUCTION SECTION)
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, ARB, DPR, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

Background

Stationary source emission reduction measures rely on all available control technologies and are proposed to be implemented between 2003 and 2010. The draft 2003 AQMP includes 18 control measures for stationary sources as identified in Appendix IV, Section I Stationary Source Control Measures. The intent of this contingency control measure is to accelerate the starting implementation schedule of those measures having an implementation date of 2004 or later. There are 9 stationary source control measures that have implementation dates of 2004 and beyond.

Regulatory History

The AQMP has historically established a schedule whereby proposed control measures will be implemented. This schedule is developed with the consideration of staffing resources, needs for technological advances in industries, and economic burdens on industry.

PROPOSED METHOD OF CONTROL

Under the 1990 Clean Air Act Amendment, EPA recommends "as a contingency measure the requirement that measures which would take place in later years if the area met its RFP target or attainment deadline, would take effect earlier if the area did not meet its RFP target or attainment deadline." Thus, in the event the District or Air Resources Board determines that the District failed to either achieve interim emission reduction goals or maintain adequate progress towards attainment of ambient air quality standards, the District will accelerate the implementation schedule for the emission reduction stationary source control measures in the draft 2003 AQMP.

This contingency control measure proposes to accelerate the starting implementation date for the stationary source control measures that have implementation dates on and after 2004. For each control measure in Table I, the adoption, starting, and ending implementation dates as proposed in the draft 2003 AQMP, along with revised starting implementation date is identified. As shown in Table I, this measure does not propose changes to the ending implementation date schedule.

TABLE I

Proposed Contingency Implementation Schedule for Stationary Source Control Measures with Starting Implementation Dates Post 2004

CM Number	Control Measure Title	Adopt Date	Starting Implementation Date		End Implm. Date
			2003 AQMP	Revised	
CTS-07	Further Emission Reductions from Architectural Coating (Rule 1113) (VOC)	2003	2006	2005	2008
CTS-10	Miscellaneous Industrial Coatings & Solvent Operations (Regulation IV and XI) (VOC)				
	Phase I	2004	2006	2005	2008
	Phase II	2005	2007	2006	2009
	Phase III	2006	2008	2007	2010
FUG-05	Emission Reductions from fugitive Emission Sources Phase III (VOC)	2003	2005	2004	2008
CMB-07	Emission Reductions from Petroleum Refinery Flares (All Pollutants)	2004	2005	2004	2004
CMB-10	Additional NO_x Reductions for RECLAIM (NO_x)	2004	TBD	2006	2006
BCM-07	Further PM10 Reductions from Fugitive Dust Sources (PM10)	2004	2006	2005	2005
BCM-08	Further Emission Reductions from Aggregate and Cement Plant Manufacturing Operations (PM10)	2004	2006	2005	2005
PRC-03	Emission Reductions from Restaurant Operations (PM10)	2003 2004	2004 - 2010	2003	2010
PRC-07	Industrial Process Operations (VOC)				
	Phase I	2004	2006	2005	2007
	Phase II	2005	2008	2006	2010

As previously discussed, the implementation schedule is developed with the consideration of staffing resources. Accelerating the implementation schedule, although feasible, may require additional District resources to adopt and implement control measures.

EMISSIONS REDUCTION

This measure is designed to achieve the maximum emission reductions in the most expeditious manner in the event that interim emission reduction goals are not met or adequate progress towards attainment of ambient air quality standards is not maintained. The emission reductions from the accelerated schedule for implementation of these control measures will be equivalent to those emission reductions projected for each individual control measure and will not be altered by a change in the implementation date.

RULE COMPLIANCE AND TEST METHODS

Shifting the starting implementation dates will not alter the rule compliance or test methods for each for each individual control measure. Rule compliance and applicable test methods are specific to each control measure and are discussed in Section I of this appendix.

COST EFFECTIVENESS

Accelerating the starting implementation schedule is not expected to change the cost effectiveness associated with individual control measures. A discussion of the potential cost effectiveness for each control measure referenced herein is provided in Section I of this appendix. The overall cost effectiveness of this contingency control measure has not yet been determined.

IMPLEMENTING AGENCY

The implementing agency is dependent on each specific control measure and includes the District and local government.

REFERENCES

Environmental Protection Agency. 40 CFR Part 52. State Implementation Plans, General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, Proposed Rules. April 16, 1992.

ENHANCED OXYGENATED FUELS CONTENT [CO]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ON-ROAD MOTOR VEHICLES
CONTROL METHODS:	USE OF OXYGENATED FUELS
EMISSIONS (TONS/DAY):	NOT DETERMINED (SEE EMISSIONS REDUCTION SECTION)
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	EPA, ARB

DESCRIPTION OF SOURCE CATEGORY

Background

Oxygenates are compounds which contain carbon, hydrogen, and oxygen. The use of oxygenated fuels will provide a certain level of oxygen enrichment, or enleanment during fuel-rich modes of operation such as cold starts. This enleanment usually results in reduced CO emissions. In addition, slight decreases in VOC emissions, as well as increased NO_X emissions, may result. Two types of oxygenates have been the primary focus of interest by regulatory agencies--ethanol and methyl tertiary butyl ether (MTBE).

Regulatory History

Various government agencies have implemented oxygenated fuels programs. For example, the Colorado Air Quality Control Commission enacted its oxygenated fuels program on January 1, 1988. This program requires oxygenated fuels to be sold in ten non-attainment areas each winter season (November through February). A minimum oxygen content requirement of 1.5 percent by weight was required during January and February of 1988. This oxygen content requirement was increased to 2 percent by weight for subsequent winter seasons. Beginning in December 1990 (for December through February only), the oxygenated fuels requirement was increased to 2.6 percent by weight for all gasoline grades, except premium unleaded. In addition to the program in Colorado, oxygenated fuels programs are also in effect in Arizona as well as Las Vegas and Reno, Nevada.

In October of 1990, amendments to the federal Clean Air Act (CAA) were adopted. Included in the revisions are oxygenated fuels mandates for CO nonattainment areas. As specified, sale of oxygenated fuel, with oxygen content of not less than 2.7 percent by weight, would be required during that portion of the year in areas that are prone to high ambient CO concentrations (winter months).

In November 1991, ARB proposed limits that are different than the 2.7 percent by weight limit specified in the CAA because the oxygen limit specified in the CAA could potentially increase NO_X emissions from motor vehicles. Studies by ARB indicated that increasing the oxygen content from 2 percent to the federal specified average of 2.7 percent oxygen, could increase NO_X emissions from 1

to 9 percent based on the type of oxygenate used. As a result, ARB adopted new wintertime oxygen content standards for California of 1.8 - 2.2 percent by weight beginning in 1992. By 1996, 1.8 - 2.2 percent by weight oxygen content will be required year-round. It should be noted, however, that ARB has indicated the data on the effect of oxygenates on NO_X emissions is still under investigation. It is uncertain whether the NO_X effect is dependent on the type of oxygenate or the oxygen content.

In the event that the District fails to achieve CO National Ambient Air Quality Standards (NAAQS), the District would require a minimum oxygen content of 3.1 percent for winter months only. In Title I in the preamble to the federal Clean Air Act, EPA states that, "for serious nonattainment areas, a logical contingency measure for failure to attain by the attainment date would be the adoption of a requirement for a minimum 3.1 percent oxygen content of gasoline subject to the waiver provisions in section 211(m)(3)."

PROPOSED METHOD OF CONTROL

This contingency control measure proposes to increase the oxygen content of gasoline sold in the Basin during winter months. The oxygen content would be as high as necessary to offset one years worth of emissions growth associated with increased vehicle miles traveled (VMT). To ensure that implementation of this contingency control measure does not result in significant increases in NO_X emissions, measures can be taken such as avoiding specific types of oxygenates.

EMISSIONS REDUCTION

Implementation of this contingency measure would result in CO emission reductions. The amount of CO emission reductions would be dependent on the oxygen content and the type of oxygenate used. Test data indicates for gasoline with an oxygen content of 2.7 percent, that CO emission reductions can range between 4 and 20 percent (ARB, 1991). The variation in the test data is attributed to the type of oxygenate and the testing methodology.

NO_X emissions increases may also occur as a result of an oxygenated fuels mandate. Significant NO_X emission impacts from an oxygenated fuels program could interfere with attainment of the ozone ambient air quality standard. However, since this measure is primarily designed to be implemented in the cooler winter months, increased NO_X emissions as an ozone precursor may not be a significant issue. Should this measure be implemented, the District will seek to monitor NO_X concentrations as part of this implementation of this measure.

RULE COMPLIANCE

This measure would require reporting, recordkeeping and monitoring to complete the compliance plans and ensure their enforceability.

TEST METHODS

Test methods could include:

1. ASTM D 323-58 or CCR Section 2297 - RVP
2. ASTM D 2622-87 - Sulfur Content
3. ASTM D 3606-87 - Benzene Content
4. ASTM D 1319-88 - Olefin Content
5. ASTM D 4815-88 - Oxygen Content
6. ASTM D 86-82 - T90 and T50
7. ARB MLD 116 - Aromatic Hydrocarbons

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The U.S. Environmental Protection Agency and the Air Resources Board would be responsible for implementing this control measure.

REFERENCES

California Air Resources Board. Phase 2 Reformulated Gasoline Specifications and the Wintertime Oxygen Content of Gasoline. Staff Report. October 1991.

Livo, Kim. State of Colorado Department of Health. Personal communication with David Coel, SCAQMD, April 1991.

Manufacturers of Emission Controls Association. 1990. MECA Summary of the Title II Provisions of the Clean Air Act Amendments of 1990. December, 1990.

South Coast Air Quality Management District. Air Quality Management Plan, 1989 Revision. March, 1989.

U.S. Environmental Protection Agency. Guidance on Estimating Motor Vehicle Emission Reductions From the Use of Alternative Fuels and Fuel Blends. January, 1988.

U.S. House of Representatives. Clean Air Act Amendments of 1990--Conference Report to Accompany S. 1630. Report 101-952. October, 1990.

U.S. Environmental Protection Agency. 40 CFR Part 52. SIP, General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990. Proposed Rule. April 1994.

CONTROL OF EMISSIONS FROM MISCELLANEOUS SOURCES [PM10]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	MISCELLANEOUS PM10 EMISSIONS
CONTROL METHODS:	FURTHER CONTROLS ON WEED ABATEMENT OPERATIONS
EMISSIONS (TONS/DAY):	TO BE DETERMINED
CONTROL COST:	TO BE DETERMINED
IMPLEMENTING AGENCY:	NOT APPLICABLE

PROPOSED METHOD OF CONTROL

Future regulations to require mowing or cutting for weed abatement would likely be implemented through clarifications and/or additional Rule 403 requirements. Additional controls could include provisions to limit weed abatement to the early morning hours (winds are typically lower in the morning), lower vehicle speeds or, in instances when mowing is not feasible, require pre-treatment of the site with a watering truck.

EMISSIONS REDUCTIONS - TECHNICAL FEASIBILITY

Mowing for weed abatement is presently feasible and many jurisdictions already encourage mowing of a site rather than discing. Consultation with the industry has indicated that mowing is much more difficult than discing on a site with protruding obstacles (e.g., rocks). Mowing in these areas requires the equipment operator to remove the obstacles prior to clearing the site. This adds greatly to the time needed to conduct weed abatement activities.

Since this is not a recognized source category, emission estimates from weed abatement activities are presently not included in the PM10 emission inventory. Because of this, and the fact that the specific differences in PM10 emissions between mowing and discing are not known, the overall emission reduction of this control measure cannot be calculated.

RULE COMPLIANCE

Future regulations could be developed to require mowing instead of discing for weed abatement, if additional research warranted this as an effective PM10 control measure. Each of the agencies that issues weed abatement orders presently maintains information on the areas in which control is necessary. This information could serve as recordkeeping of control measure implementation.

TEST METHODS

Compliance determinations with future regulations could be made through field inspections of areas in which weed abatement is required. Agency recordkeeping information could be used to improve coordination of compliance activity.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Agency consultation indicates that weed abatement orders are typically issued by the appropriate agency with a specified compliance date. Property owners can have the work done or can wait for county action. After the mandatory compliance date has lapsed, agency personnel inspect the properties for compliance. Non-compliant properties are scheduled for weed abatement and property owners are billed for the costs incurred by the agency. Available average cost information is presented below (Thomas, 1994).

Control Option	**Costs per Acre**
Discing	$30.00
Mowing	$40.00

These are average costs and do not account for the unique circumstances encountered on individual properties. Mowing, for example, may be much more expensive than discing because mowing may be required several times per year. Additionally, under an order for weed abatement, a property owner may be able to establish fire breaks around the perimeter using discing rather than mowing the entire site (Thomas, 1994). For these reasons of variability cost effectiveness estimates are presently not available.

IMPLEMENTING AGENCY

The SCAQMD has the authority to require mowing instead of discing for weed abatement. Coordination with agencies responsible for issuing weed abatement orders would improve control measure implementation.

REFERENCES

AeroVironment. 1992. PM_{10} Emission Control Measure Demonstration Projects in the Coachella Valley. February, 1992.

Thomas, Griff. 1994. San Bernardino County Agricultural Commissioner, Weed Abatement program. Staff communication, January 27, 1994.